

NEIGHBORHOODS AS SETTINGS FOR REAL ESTATE ANALYSIS:
AN EXPLORATION OF PHYSICAL, SOCIAL AND
ECONOMIC VARIABLES AS DETERMINANTS OF
MARKET SETTINGS

By

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Abstract of Dissertation Presented to the Graduate
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The real estate appraisal process requires the appraiser to define the neighborhoods. The analysis of the neighborhood is considered to be an important step in estimating the highest and best use of a property which, in turn, is a crucial step in estimating its market value. The neighborhood is also important within the valuation process itself, for it is within this geographic area that the comparable market data (sales, rents, vacancies, expenses, lending attitudes, etc.) are supposed to be found.

The literature consistently refers to a "neighborhood" as a contiguous area. Yet most real estate markets are not limited to one contiguous area, especially in automobile oriented suburbs. Real estate brokers and salespeople have recognized the limitations of considering a market as restricted to a contiguous area. They usually show prospective homebuyers alternative residences in separated areas or

neighborhoods they believe are competitive and comparable. A grouping of comparable neighborhoods may be referred to as a market setting, and "market setting" is suggested as a term superior to "neighborhood" in these contexts.

The hypothesis that "market setting" is a superior describer of subsections of the community within which real estate should be analyzed has been studied through cluster and regression analyses of listings of single-family detached houses in the adjoining towns of Guilford and Madison, Connecticut. Both cluster and regression analyses supported "market setting" as a superior term to "neighborhood" although the support from regression analysis was not as strong as from cluster analysis.

CHAPTER ONE INTRODUCTION

Statement of the Problem

Real estate appraisers are taught, and appraisal organizations stress, that each appraisal should include a neighborhood analysis (AIREA, 1967, 1978; Bloom & Harrison, 1978; Kinnard & Boyce, 1975, 1981; Kinnard, Messner & Boyce, 1979; Lomax, 1976; Smith, 1976). The description of this neighborhood usually begins with the physical definition of a contiguous geographic area within which the subject property lies. It continues with the description and analysis of the physical, economic, governmental and sociological characteristics within this area.

One of the principal reasons for the inclusion of the neighborhood analysis in an appraisal is that it serves as the area from which comparable data (i.e., sales, rents, vacancies, etc.) are obtained (AIREA, 1967, p. 12; Interagency, 1971, pp. 7-9; Kinnard, 1971, p. 119).

Appraisers are not the only real estate analysts concerned with the environs of a property. The process used by architects, planners and developers has not been structured as formally as has the appraisers'. Part of the problem faced by real estate analysts and appraisers is that the neighborhood is usually the only geographic area that is not defined by political jurisdiction boundaries; regions, counties, cities, townships and even properties are all geographically defined. The lack of an established delineation for a neighborhood forces appraisers and analysts to use their judgment thereby creating an area wherein two

analysts can differ. The analysis of "neighborhoods" usually falls between the analyses of regions, counties, cities and townships and the analysis of properties in the above list of decreasing land areas. The lack of established delineations for neighborhoods also indicates their variability--their size and make-up fluctuate over time.

Many times this judgment has been based on the physical structures in an area (i.e., three story versus four) or on major thoroughfares and roads perceived by the analyst to be a boundary when they may be the unifying factor of another neighborhood such as Park Avenue in New York City. Frequently politically or governmentally delineated areas such as census tracts, political wards or school districts are considered to be neighborhoods (Broden, Roos & Kirkwood, 1979). These areas tend to remain unchanged for years which may not take into consideration the changes that are occurring in the population of the area.

Property does not "make" value; people make values (May, 1953, p. 88; Ratcliff, 1972, p. 14). The choice of where to live and then the obtaining of that selection reflects individual values; whether to own or rent, large house or small, and in which part of town are but a few of these choices. Negotiation or the "haggling" of the market, supporting the market principle of supply and demand, reflects the attitudes of the people involved. The neighborhood is the place where the micro-society as the individual, family and household meets the macro-society such as the city or society in general (Goldstein & Davis, 1977, pp. 9-10). The neighborhood is where city or regional changes are felt by the individual and wherein he can react to them.

Yet the concept "neighborhood," while recognized by most residents, is an imprecise term for analytical purposes. A review of the

literature shows the term is defined inconsistently except for one characteristic: the term always refers to a single geographically contiguous area. By itself, this definition is impractical for the analysis of real estate everywhere in the United States and perhaps elsewhere, for a contiguous area may not reflect the market area. As will be illustrated, the literature shows the definition of a neighborhood as a single geographic area is generally accepted by the lay public and by professional analysts. Therefore, since the definition cannot be changed, a new term needs to be found to replace "neighborhood" that has universal application; the term "market setting" is suggested as the replacement.

Research Question

It is the contention of this paper to show that the term "market setting" may frequently be a superior describer of the sub-section of the community within which real estate is analyzed than is the term "neighborhood." Furthermore, it is the contention of this paper that many real estate analysts have been employing the broader market setting definition, while improperly titling it "the neighborhood."

The purpose of this paper is to develop ways of assisting real estate analysts in defining and differentiating neighborhoods and market settings within the constraints of typical assignment budgets.

Significance and Application

The theoretical and practical significance of this study is believed to be considerable. Appraisers are required to define neighborhoods. This study explores variables that nonresidents can use in defining neighborhoods and demonstrates that the appraiser can expand his search area to non-contiguous competitive areas in order to improve

his picture of the market. Real estate appraisers and analysts will be able to use the results of this study in their work.

The study will provide a bibliography on neighborhood definitions and models of the different ways neighborhoods are defined. Furthermore, the utility of selected statistical tests will be presented. Previously no such study of neighborhoods has been conducted or these data assembled in one place.

Organization of the Study

First, different definitions of neighborhoods will be gathered through a review of the literature. These will include definitions used by real estate appraisers and analysts, planners, government agencies, and sociologists. Second, the consistency of these definitions to modern real estate analysis will be studied, together with the ease of implementation of each implied concept or model. Specific variables will be identified and discussed. Third, statistical methods of delimiting, differentiating, and combining geographic areas into market settings will be shown and analyzed.

The principal statistical method will be cluster analysis. Listings of residences in the suburbs of New Haven, Connecticut, will be analyzed.

Review of the Literature

Historical Context of the Problem

The concept of neighborhood as a grouping within a geographically contiguous area is presupposed by appraisers and appraisal organizations and appears to date from the formal beginning of the profession. Babcock (1932) refers to "small areas" (p. 55). It has its origins in

the accepted dictionary definition of the period (Webster's, 1934, p. 1638) and has been carried forward to the current definition promulgated by the American Institute of Real Estate Appraisers and the Society of Real Estate Appraisers:

A portion of a larger community, or an entire community, in which there is a homogenous grouping of inhabitants, buildings, or business enterprises. Inhabitants of a neighborhood usually have a more than casual community of interest and a similarity of economic level of cultural background. Neighborhood boundaries may consist of well-defined natural or man-made barriers or they may be more or less well-defined by a distinct change in land use or in the character of the inhabitants. (Boyce, 1981, p. 172)

This description is similar to the current English (Oxford, 1933, pp. 84-85) and American (Webster's, 1961, p. 1514) dictionary definitions.

The concept of grouping into discrete contiguous areas was recognized as early as 1828 as not the always appropriate definition in America. Webster (1828) noted the unique character of neighborhoods in the United States when he defined neighbor:

One who lives near another. In large towns, a neighbor is one who lives within a few doors. In the country, a neighbor may live at a greater distance; and in new settlements, where the people are thinly scattered over the country, a neighbor may be distant several miles. Such is the use of the word in the United States.

The Boyce definition and current dictionary definitions have abandoned the unique American characteristic. The concept of discrete contiguous areas may be applicable to pre-World War II communities designed around pedestrian travel and mass transit. The same concept may not be equally applicable to newer communities wherein the automobile is the principal mode of travel and around which land uses have been planned. If in the former the appellation "neighborhood" is used,

the term is consistent with the Boyce (1981) definition. However, for the latter, the older Webster (1828) definition may be superior. Neither specifically allows for the situation whereby non-contiguous areas may share the same market and compete with one another across non-competitive territory. Were they contiguous to each other, the Boyce (1981) definition would be met; were the intervening areas to reflect the same market, the Webster (1828) definition would be met. Several older cities such as Savannah, Georgia, were designed around neighborhoods but the suburbs (older or newer) never were (Scribner, 1976). The separation of competing areas has caused the need for a new term to satisfy the required order of analysis in appraisal reporting.

Neighborhoods wherein families remained sometimes for several generations rarely exist today. The style of life in the United States, and to differing extents throughout the world, has changed in the twentieth century and especially since World War II (Chilman, 1979; Hodges 1977; Rockefeller, 1973; Watts, 1981 and Yankelovich, 1981). In this century we have seen shifts in industry from farm and home to the factory and office. The population of the United States in the first 25 years of this century increased 280.7% with more than half (57.4%) occurring since 1940 (AIREA, 1980, p. 10-6). Meanwhile the population per dwelling unit has declined from 4.76 persons in 1900 to 3.67 in 1940 and 2.94 in 1975, an overall decline of nearly two persons per dwelling unit (AIREA, 1980, p. 10-6). This shift has accompanied changes in the concept of family. "Under the impact of urbanization, families are no longer self-contained units, children become an economic cost rather than an economic asset" while at the same time scientific advances have reduced infant mortality (Chilman, 1979, p. 16) and made education more

important. In 1940, the adult U.S. population had completed a median of 7.0 years of schooling; by 1975 the figure had increased to 12.5 years--from a median education level of the adult population at the beginning level of junior high school to one having completed a semester of college (AIREA, 1980, p. 10-6).

Technology has enabled us to move around more and spread further apart while still communicating. Dependency on the automobile has become a way of life (Hodges, 1969, p. 35; Jacobs, 1961, Chap. 18; Tunnard & Pushkarev, 1963, p. 318). Prior to World War II the United States had 32.5 million automobiles on the road; this was two-thirds of all the automobiles in the world, and the United States was called "probably the travelingest nation in history" (U.S. War Department, 1949). Automobile use has grown since World War II especially with the construction of the Interstate Highway System. In 1948, 54% of the families in the United States owned automobiles (U.S. Department of Commerce, 1961, p. 560); by 1977, 84.1% of all occupied housing units had one or more cars available (U.S. Department of Commerce, 1981, p. 628). Accompanying the growth in transportation in this century has been the communication revolution in "telegraph, telephone, cinema, phonograph, radio and television" (Chilman, 1979, p. 17). The growth in television has been the most recent of these. From approximately 4 million sets in the United States in 1950 the number had increased to almost 75 million sets in 1980 (Help! Teacher, 1981). Worldwide live television communication has had a dramatic effect on American attitudes toward war (i.e., Viet Nam) and government credibility (i.e., Watergate) as well as providing an in-house entertainment system. While providing entertainment at home, television has provided widespread distinction

for more than 30 years of behaviors in and attitudes toward life in cities and suburbs. The civil disturbances of 1967 and 1968 were broadcast live from the city areas where they were occurring. Most crime shows (i.e., *Naked City*, *Streets of San Francisco*, *Kojak*, *Cagney* and *Lacey*, etc.) and situational comedies (i.e., *Three's Company*, *The Jeffersons*, *All In The Family*, etc.) have shown cities to be inferior places in which to live. Conversely, suburbs have been shown superior for more than 30 years through television (i.e., *The Dick Van Dyke Show*, *Happy Days*, etc.). These attitudes have become more ingrained and accepted as television usage has increased. "By age 18, the average American has spent an estimated 15,000 hours in front of the set, far more than in school" (Help! Teacher, 1981, p. 90). Other knowledge, customs and values can be shared through television while reducing the characteristics that allowed them to be unique to geography, class or ethnic group. Television, increased mobility and isolation permitted by the automobile and the relocation of people made easier, in part, by relatively low long distance telephone rates, have started to erase regional differences. Goodman (1981) has observed that American accents have started to lose their regional differences.

Chilman (1979) refers to a concomitant revolution of rising aspirations: "Aspirations have risen for more equal distribution of material goods, increased respect for a diversity of cultures, and enhanced sharing of decision-making powers. Aspirations have also risen for greater psychological fulfillment: personal happiness, self-expression, and a wealth of life experiences" (p. 17). The behavior of Americans toward automobile and homeownership--usually the two largest individual or family purchases--reflects this change. The rise in

automobile ownership has been documented earlier; the rise in homeownership has also risen dramatically. "In 1940, 43.6% of the nation's households were homeowners. . .the 1980 census revealed 64.4% owned their homes" (Guenther, 1982, p. 25). The increased mobility and desire for homeownership have lead to the growth of suburbs as the latest ring of development outside the city (Gans, 1968, p. 49). The Federal government expenditures have reflected and aided this urban shift. The Housing Act of 1949 which established the national goal of a "decent home and suitable living environment for every American family" also initiated slum clearance and urban renewal (Smith, Tschappat & Racster, 1981, p. 492). In 1968, the neighborhood development programs were also created. Both were active until 1973 when they were phased out, but from 1950 through 1973 a total of \$11.7 billion of federal monies were spent on rebuilding our cities (Personal communication with D. Luck, U.S. Department of Housing and Urban Development, June 10, 1981). During much of this same period, the interstate highway system was built. Created under the Defense Act of 1956, interstate highways have not only eased intra- and inter-state travel, but have enabled people and businesses to move from cities--the growth of suburbs along interstate highways is sufficient testimony. Between the passage of the Defense Act of 1956, and the end of fiscal year 1979, \$108.1 billion were spent by the Federal government from the Highway Trust Fund, primarily for interstate highways (U.S. Department of Transportation, 1979, p. 51). In effect, many more monies have been spent to support the suburbs than to rebuild the central city within the ring of suburbs thereby reinforcing the attitude that the suburbs are more important which, in turn, reflects the added desire for mobility of Americans.

Hodges (1977) refers to some signs of emerging community values: less durable buildings, speculation for profit, planning and zoning inadequacies, dependency on the automobile as a way of life, open spaces, improperly located, and the overextension of credit (p. 34-36). Rockefeller (1973) is concerned with the conflict of values in today's society (Chap. 5) and sees some new values emerging (Chap. 6).

Hodges (1977), Rockefeller (1973), Rappaport (1977), Watts (1981) and Yankelovich (1981) have shown that personal values appear to be changing in America. Sheehy (1976) and others talk of the rising divorce rate, yet it may be merely a social reaction to longer lives. Glick and Norton point out in Sheehy (1976) "The median duration of marriage before divorce has been about seven years for the last half century" (p. 14); marriages used to be shortened more by death, now more by divorce. Yet, divorce has been accepted to the point where divorce does not affect political futures as the successes of Gerald Ford, Nelson Rockefeller and Ronald Reagan can attest.

Sanford (1979) describes a way that value changes may be reflected in real estate analysis. He attributes this to a theory of Rokeach.

The theory is based on the assumption that human beings possess hierarchically ordered belief systems in which self-conceptions (i.e., cognition about one's own competence or morality in specific situations or roles) are the most central elements. Values are the next most central or important elements in the belief system. A value is an enduring belief that a specific mode of behavior is personally or socially preferable to an opposite mode of behavior. It is a standard that guides and determines action, attitudes toward situations, ideology, presentation of self to others, evaluations, judgements, and attempts to influence others. Less central than selfconceptions and values are attitudes. An attitude differs from a value in that an attitude refers to an organization of several beliefs around a specific object or situation. A value on the other hand, refers to a

single belief of a very specific kind. We therefore have a system for understanding the derivation of behavior and attitudes. Given that self-conceptions are the most central element of the belief system, with values deriving from these selfconceptions, then both behavior and attitudes may be conceptualized as deriving from values. (pp. 2-3)

Rokeach's statement says that as people define themselves differently (i.e., in economic terms rather than in ethnic terms), their values change (i.e., from associating with those of similar ethnic background to associating with those of similar economic levels), and their behaviors change (i.e., living in areas defined economically rather than in ethnically defined areas). Chapin and Weiss (1965) have developed a similar hierarchy to explain location or land use decisions starting one step below Rokeach's selfconceptions and dividing the last level further.

...land development can be conceived as a kind of third-order outcome of a line of human action set in motion by man's effort to accommodate to his environment. In the most elemental form of this framework, the first-order concern is with value systems formed from man's experience with his environment--here, an urban one. The second-order area of analysis focuses on behavior patterns--the various kinds of human activities involved in city life which have become sufficiently routinized to take the form of definite patterns. (p. 4)

A real estate analyst can observe behaviors and their changes. As Rokeach and Chapin and Weiss have stated, changes in behavior reflect changes in personal values. For example, as people have left economically diverse neighborhoods for economically stratified suburbs, the neighborhoods left behind usually became less diverse. As families have discounted living near relatives for life in communities of people similar in age and employment to themselves, first home buyer developments have grown. The Levittowns outside New York and Philadelphia

after World War II were designed for this market and still cater to it. Similarly "empty nester" developments such as Heritage Village in Connecticut have been created. These newer homogeneous developments have a similar appearance nationwide (Russo, 1974).

The term "neighborhood" is usually considered as perceptual--both on the part of its residents (Michelson, 1976, p. 53) and others such as real estate buyers, brokers, appraisers, analysts, sociologists, economists, planners and government officials. Most analysts have neither the time nor the budget to learn the definition of each neighborhood as perceived by its residents. In fact, the residents, even if they should agree on a neighborhood delineation, may not give a definition of neighborhood consistent with what the analyst is seeking. For example, a real estate appraiser may be seeking the definition of neighborhood for use in an estimation of market value. Since market value is usually considered through the eyes of informed buyers (Kinnard & Boyce, 1975), the buyers' definition of neighborhood is what the appraiser is seeking. The appraiser needs a delineation of a market area which, as Kinnard (1971) has said, is not the same as neighborhood (p. 50).

Analytical Context of the Problem: Why Study the Neighborhood?

The prior section included reference to appraisal organizations that require a neighborhood analysis in an appraisal. But is this sufficient reason? There is a rationale for neighborhood analysis beyond this requirement.

The development of a property, its utilization, in a market sense is a function of two factors (Smith, Tschappat & Racster, 1981, Chap. 8). The first is the physical character of the property, for it is the cause of process costs--the costs of processing the site into a use.

The second is the locational character of the property which is represented by transfer costs--the costs of interacting between the property and other properties such as between a residence and the workplace, school, shopping and recreation. In this sense location is considered an economic phenomenon. Both physical and economic characteristics are treated by people together with governmental and sociological functions in deciding on homes, jobs and play areas. These property characteristics manifest themselves, sometimes slightly differently on a larger scale, in neighborhoods.

The immobile nature of real property and its externalities provide a reason to study the physical environs of the property; these environs, usually referred to as the neighborhood, are a social phenomenon. The sociologist Lofland (1971) has stated the reason for the analysis of social phenomena:

Inquiry or analysis is usually thought of as the attempt to answer one or more of only three questions:

1. What are the characteristics of a social phenomenon, the forms it assumes, the variations it displays?
2. What are the causes of a social phenomenon, the forms it assumes, the variations it displays?
3. What are the consequences of a social phenomenon, the forms it assumes, the variations it displays?

As simple as it may seem, social inquiry and social theory reduce basically to the attempt to provide answers to these three questions. (p. 13)

In addition to the analytical reasons for studying neighborhoods the lay public, governments and architects as well as real estate analysts have recognized the importance of neighborhoods. The public has used the term neighbor and neighborhood for many years. In 1686 the term "neighbours" was used in Connecticut (Bushman, 1967, p. 89 fn). In

1711 Steele defined them as "Those little Communities which we express by the Word Neighborhoods." Today, newspapers use the term (Back-To-City, 1979; Brooks, 1980; Harris, 1982; Leon, 1981) as do politicians. In New York City, a Neighborhood Preservation Party was established in 1977 (Fowler, 1977). Nor is the term restricted to the city; as Spectorisky (1955) and Downs (1973, 1981) refer to neighborhoods in suburbs, too. The neighborhood is the place where the micro-society such as the individual, family and household meets the macrosociety such as the city or society in general (Goldstein & Davis, 1977, pp. 9-10). The neighborhood is where city or regional changes are felt by the individual and wherein he can react to them.

The Federal government through the U.S. Department of Housing and Urban Development has been making Community Development Block Grants to neighborhoods for several years without a formal definition of the term "neighborhood" (Federal Register, 1978; U.S. Department of Housing and Urban Development, 1981). President Reagan has proposed "Enterprise Zones" (U.S. Department of Housing and Urban Development, 1982, a, b, c) to provide funding to geographic areas referred to as neighborhoods with no further definition of the term than provided for Community Development Block Grants (Federal Register, 1978). In 1980, the U.S. Department of Health, Education and Welfare made a seed grant of \$312,000 and the City of New Haven, Connecticut, matched it with \$90,000 for a three year pilot project to provide housing for the elderly in a neighborhood in New Haven; the area was supposed to be defined by the city (Brooks, 1980).

The federal government has been concerned about this lack of clear definition for the term "neighborhood." In the past few years the

federal government has contracted for several studies to determine what neighborhoods are and how they behave. Thirteen have been examined in the preparation of this study (Bielby, 1979; Birch, Brown, Coleman, Da Lomba, Parsons, Sharpe & Weber, 1979 a, b; Broden, Roos & Kirkwood, 1979; Broden, Kirkwood, Roos & Swartz, 1980; Carlson, 1978; Casey, 1980; Hammer, Siler, George Associates, Westat, Inc. & University City Service Center, 1979; Miller, 1980; Mills, 1979; National Institute for Advanced Studies, 1979; Sumka & Cicin-Sain, 1978; Weicher, Yap & Jones, 1980). Most of the reports produced by the government fail to provide neighborhood definitions, but rather accept the hypothesis that the definition is understood or assumed. The other reports rely on neighborhood designations by the cities. The U.S. Department of Housing and Urban Development under President Carter recognized the political importance of neighborhoods with the creation of its Office of Neighborhoods, Voluntary Association and Consumer Protection. In addition, the U.S. Department of Housing and Urban Development, Policy Development and Research, Office of Housing Studies has a division of Community Planning and Neighborhood Studies. A National Commission on Neighborhoods was established by President Carter under the National Neighborhood Policy Act of 1974 ". . .to investigate the causes of neighborhood decline, and to recommend changes in public policy so that the federal government becomes more supportive of neighborhood stability" (National Commission on Neighborhoods, 1979, p. vii).

In 1975, the National Association of Neighborhoods (1979) was established as a private non-profit ". . . voice of the neighborhood movement in America." The National Trust for Historic Preservation established its Neighborhood Office and began publishing *Conserve*

Neighborhoods about 1978 (Personal communication with M.F. Pepson, Information Program Manager, Neighborhood Office, National Trust for Historic Preservation, Feb. 13, 1981).

The National Policy Task Force of the American Institute of Architects published A Plan for Urban Growth in 1972 in which the neighborhood was defined as the growth unit (p. 4). This produced a series of reports incorporating the neighborhood as the basis for reorganizing the city (American Institute of Architects, 1973 a, b, c, 1977) and some disagreement (Holden, 1972a, b). This "growth unit" is similar to the "neighborhood unit" described by Nelson and Aschman (1957) ". . .as the basis for design of living areas" (p. 331).

Some of the early texts written by appraisers have stressed the need for neighborhood analysis. F. Babcock considered the analysis of the neighborhood endemic to the analysis of the city (1932, p. 55). Both Babcock and McMichael considered the relationship of the city and the neighborhood to be of paramount concern to the appraiser. Babcock (1932) referred to ". . .small areas which together make up the city and which, in turn, the city has created and will continue to modify" (p. 55). McMichael (1951) concurred, ". . .the city creates a neighborhood . . ." (p. 164). May (1953) said ". . .the study of the neighborhood is far more important than the study of the physical property itself" (p. 105). May (1953) clarified this relationship,

Thus we may think of the neighborhood as an integrated social and economic entity enfolding the property to be appraised and exerting its influences upon it. As the property is the heart of the problem, so is the neighborhood the pericardium which surrounds and protects it. (p. 87)

It may be said these writers represent the "old school" and not the "new school" of appraising (Lusht, 1975), and a recent compendium of

readings (American Institute of Real Estate Appraisers, 1977) tends to support this, for little is said about neighborhoods outside of its role in estimating depreciation (Adams, 1969; Knowles, 1967). Two other readings (Shenkel, 1967; Wendt, 1977) do stress the importance of neighborhood analysis without explaining how it is to be accomplished. Yet, still the texts and narrative report guidelines state the neighborhood must be analyzed.

The United States, state and local governments and financial institutions are major employers of real estate appraisers and analysts. Every governmental acquisition (i.e., for highways, urban renewal, schools, etc.) requires at least one and many times two or more appraisals. Most government dispositions also require one or more appraisals. Every mortgage by an institution insured by the Federal Savings and Loan Insurance Corporation requires an appraisal, and the Federal Deposit Insurance Corporation strongly suggests this policy for its member institutions (Interview with Mr. Bonfanti, Boston Office, Federal Deposit Insurance Corporation, July 13, 1982). This includes most of the mortgages made by commercial banks, mutual savings banks and savings and loan associations. Furthermore, any mortgage that these or other institutions or individuals plan to sell to the Federal National Mortgage Administration (FNMA) or to the Government National Mortgage Association (GNMA) must be accompanied by an appraisal. Also, any mortgage insured by the Federal Housing Administration (FHA), guaranteed by the Veteran's Administration (VA) or insured by a private mortgage insurer must be accompanied by an appraisal. The appraisal report form prepared jointly by the Federal Housing Administration of the U.S. Department of Housing and Urban Development and the Federal Home Loan

Mortgage Corporation referred to as the FHA-FHLMC mortgage form provides a brief section for neighborhood analysis (FMLMC Form 70 Rev. 9/75 is the same as FNMA Form 1004 Rev. 9/75).

Elsewhere, the Federal Government (Interagency, 1971) requires a neighborhood analysis, but requests it ". . . be kept to a minimum. . . ." (p. 36). More indicative is the statement on highest and best use:

Because the highest and best use is a most important consideration, it must be dealt with specifically in appraisal reports. Many things must be considered in determining the highest and best use of the property including: supply and demand; competitive properties; use conformity; size of the land and possible economic type and size of structures or improvements which may be placed thereon; zoning; building restrictions; neighborhood or vicinity trends. (Interagency, 1971, p. 7)

While not emphasizing the neighborhood analysis, the federal government requests the appraiser to define the neighborhood as the vicinity of the property in order to obtain comparable data from within that area:

In the absence of prior sales of the land taken, arm's-length transactions in lands in the vicinity of those taken at about the time of taking are the best evidence of market value. (Interagency, 1971, pp. B-9)

The fact that the public, appraisers and their clients and other groups consider neighborhoods important may, in itself, be sufficient reason to study neighborhoods. Earlier the immobile character of real estate was mentioned, but now let us consider the product, real estate, in relation to its market. The dominant feature of real estate is its immobility (Kinnard & Boyce, 1975). Therefore, since no two properties can occupy the same location, each property is unique. This means that in comparison with Adam Smith's model of perfect competition, the market for real estate is totally imperfect. Vandell (1982) concurs ". . . that

the real estate market is neither perfectly competitive nor certain" (p. 256). Sales of units in a perfect market are independent, but since the purchase of a parcel of real property frequently depends on the sale of another parcel, real estate rates are interdependent of time and money. In addition, the use of a parcel of property gives rise to its productivity which, in turn, leads to its value (Kinnard & Boyce, 1975). Yet, the immobility of real estate requires the market to come to the property, and this attraction is enhanced or negated (repulsed) by the environment of the property (Nelson, 1958). Ratcliff (1972) refers to this as characteristic of "market externalities" (p. 52) which he defined earlier (1961):

. . .this characteristic of fixity means that each parcel of land is vulnerable to environmental factors outside its borders. For example, if a packing plant moves in next to your home, you cannot very well pick up the real estate and move to a less odoriferous location. Each property is more or less helpless in the face of locational change and its value may be substantially affected. Of course the change may be for the better, and a good deal of real estate speculation consists in placing bets that beneficial changes in environmental factors, such as the opening of an expressway or the establishment of a new industry, will increase land values in the selected spot. (p. 45)

Smith, Tschappat and Racster (1981) refer to the importance of externalities to the development and use of a property (pp. 518-520) and mention another term for "neighborhood effects" is "spillover effects" (p. 374).

Kinnard (1971) expressed this further: "Forecasts of environmental influences must be made, with a conclusion about their probable effect on current market decisions" (p. 50). Since decisions are made by people, May's statement (1953) that "People make value" (p. 88) and Ratcliff's statement (1972) that "People make values and determine

prices" (p. 14) seem especially appropriate and tend to support the Rokeach model cited earlier. Combining May's statement with Rokeach's that people may define themselves in individual terms indicates that individual people may view real estate differently. Personal values of homebuyers are reflected in how they treat space. The values, and therefore the treatment of space, change with their personal self-definition (Sommer, 1969, p. 30). This follows the model suggested by Rokeach (Sanford, 1979, pp. 2-3) as does McMahan (1976) who observed that "a person's home and neighborhood often directly reflect personality and self-image" (p. 132).

Wendt (1974) returns to a more abstract definition of neighborhood in saying that the appraiser should study the effect of the neighborhood on property values, for "...individual districts and neighborhoods of a city change and shift over time as the city grows and land-use patterns are altered" (p. 235). Although the term "neighborhood" is not mentioned in his index, H. Babcock (1968) states the quality of the neighborhood is important to the appraisal (p. 191).

This recognition that neighborhoods change with time means analysts must continue to study and re-study them. The effect that people have in changing their environments was expressed by Bronowski (1973):

But nature--that is, biological evolution--has not fitted man to any specific environment. On the contrary, . . . he has a rather crude survival kit; and yet--this is the paradox of the human condition--one that fits him to all environments. Among the multitude of animals which scamper, fly, burrow and swim around us, man is the only one who is not locked into his environment. His imagination, his reason, his emotional subtlety and toughness, make it possible for him not to accept the environment but to change it. And the series of inventions, by which man from age to age has remade his environment, is a different kind of evolution--not biological, but cultural evolution. (pp. 19-20)

The immediate physical, economic, governmental and sociological environment of a property is usually considered to be its neighborhood which as McMichael (1951) says may change overnight (p. 166). Coupled with Bronowski's observation about man's ability to change his environment is the observation by Nelson and Aschman (1957) that large areas of cities were constructed about the same time almost as units and have aged as units. "This is one of the reasons why obsolescence in America has come to be thought of as relating to whole neighborhoods rather than to individual structures" (p. 6).

What and Who Are a Neighborhood? Traditional and Contemporary Definitions

This study has discerned that many writers about neighborhoods and the urban condition discuss neighborhoods without defining what a neighborhood is. These include economists (Birch, Atkinson, Coleman, Parsons, Rosen & Solomon, 1974), city planners (Bacon, 1967), academics (Goldfield & Brownell, 1979), critics (Von Ehardt, 1967) and appraisers (Babcock, 1968). The term is, at best, imprecise. Downs (1981) refers to four types of neighborhood:

The immediate neighborhood is the small cluster of houses right around one's own house. The homogenous neighborhood is the area up to where the market value of housing noticeably changes or where the mix of housing types or values changes. The institution oriented neighborhood is the area in which residents share common relationships with a local institution, such as an elementary school, a church, a police precinct, or a political ward. The regional neighborhood is an entire suburb or township or a district within a big city, such as the South Side of Milwaukee. Although each of these scales is appropriate under certain circumstances, they frequently make a neighborhood's boundaries vague and ill defined. (p. 14)

Warren and Warren (1975) have defined six types of neighborhoods in terms of three variables: interaction of residents, identification with

a common element and connections with a common element outside the area such as with a political party (p. 75). Downs (1981) uses a similar taxonomy in his examination of neighborhoods (Chap. 2) as does Lofland (1971) in his study of social settings (pp. 14-15).

The term is commonly defined in terms of the residents living near each other (Webster's, 1934, 1951, 1961) which may not reflect the market the appraiser or analyst is studying.

A traditional definition has been to call an elementary school district a neighborhood (AIA, 1972; Nelson & Aschman, 1957, p. 323). McMichael (1951) said it can be less than a school district (p. 166) and should have other common elements such as shopping. May (1953) states the residents of a neighborhood must have ". . .the same level of income, social attributes, ethnics, culture and education" (p. 87). Jacobs (1961) argues strongly against this homogeneity and cites several areas such as Greenwich Village in New York City as neighborhoods that are stronger through diversity. Brigham (1964, 1965) considers neighborhood to be an amenity. He qualifies it inconsistently in terms of either median family income or percentage of dwelling units with more than 1.01 persons per room. Christensen (1976) considers the neighborhood to be both a physical and a social environment (p. xi). Heumann (1975) lets neighborhood associations define their membership areas.

Kinnard, Messner and Boyce (1979) state ". . .a neighborhood is a geographic area within which any change has a direct impact on the value of the property being appraised" (p. 423). Kahn and Case (1977, p. 70), Phyrre and Cooper (1982, p. 121), Gans (1968, p. 50) and Reilly (1973, pp. 130-131) plus those authors mentioned above and all examples in the prior section all refer to a neighborhood as a contiguous geographic

area. Most also refer to a neighborhood in residential terms although AIREA (1978) and Kinnard, Messner and Boyce (1979) apply the term to industrial areas while McMichael (1951, pp. 171-173) and Smith (1976, pp. 21-28) make a distinction between a "neighborhood" as a contiguous residential area and a "district" as a contiguous non-residential area. This distinction appears both logical and consistent with conventional usage. Where the term "neighborhood" appears in newspapers, magazines and literature, the term "residential area" usually may be substituted without changing the meaning intended.

Variables for Neighborhood Analysis

Checklists of varying degrees of completeness have been prepared by appraisal organizations (AIREA, 1967, p. 10; 1978, Chap. 6; 1980, pp. 10-4 & 10-5; Kinnard & Boyce, 1975, Chap. 6; Lomax, 1976, p. 15; Stebbins, 1976, p. 46). Some are in texts used by the organizations; others are in guides to assist in the preparation of appraisal reports. Interestingly, one guide (Himstreet, 1971) fails to include neighborhood analysis. Many of these checklists have evolved, sometimes with little change, from those of practitioners and academics writing in the field (May, 1953, pp. 40-42; McMichael, 1951, pp. 166-171; Shenkel, 1978, p. 88). Neighborhood variables have also been examined by planners (Houstoun, 1976, pp. 5-6) and economists (Bielby, 1979, p. 5).

In an attempt to compare the checklists of different authors and viewpoints, the lists in the texts and guides of the appraisal organizations mentioned above have been selected with the earlier one from May and those of Houstoun, Bielby, Christensen and Kahn and Case. They have been combined below. The factors have been grouped into physical, economic, governmental and sociological categories for ease in

comparison. These categories were selected for they, or variations of them, appeared in several of the lists. Two aspects of neighborhood analysis which were included in several lists have been excluded here for they belong in no category, but rather provide a beginning and an end for the analysis. A designation of the neighborhood can be made on the basis of each of the categories; therefore, this "designation," which must begin any discussion of neighborhood factors, has been omitted from the list. Furthermore, the designation or definition of the neighborhood boundaries must be defended and explained. The conclusion of any neighborhood analysis must be the analysis of the factors in the list (Kinnard & Boyce, 1975; Stebbins, 1976, p. 46).

There is little sense in including factors that do not affect the trend of the neighborhood or of property values in it. Description and analysis must be in balance. Sufficient description needs to be included to support the analysis that, in turn, helps ". . .to order, explain or summarize the concrete details. Reports tending to descriptive excess resemble simple histories or novelistic description" (Lofland, 1971, pp. 128-29). The factors which the analyst has observed and described must be relevant to the problem. The characteristic or observation is an existing condition; what caused it and what it will lead to can be included in the analysis (Lofland, 1971, Chap. 3). The analysis must include a forecast of trends (Lomax, 1976, p. 15) that is an opinion of the economic future of the area (AIREA, 1967, p. 10). Babcock (1932) reminds us only two conclusions are possible:

1. The future will be like the past
2. The future will differ from the past (p. 55)

The conclusion must include sufficient analysis for its support. It should also reflect the ". . .relationship of the subject property to the neighborhood" (AIREA, 1967, p. 10).

The characteristics of people could all be included under sociological factors, but they have been divided among sociological and economic factors. For example, the demand for housing is income elastic (elasticity = 1.34 with $R^2 = .62$); the income elasticity of homeowners (1.11) is slightly greater than it is for renters (.8-1.0) (de Leeuw & Ekanem, 1971b, pp. 22-24). The economic factors of the population which tend to affect real estate directly have been separated from the cultural and sociological aspects. Some items appear in more than one place such as schools: the distance to schools is an economic factor, the schooling provided by the community is a government service similar to a utility (Scribner, 1976), and the attitude of the community toward schools is a sociological factor.

In the following list of factors that may be considered in a neighborhood (or district) analysis, items have been included that may not always be applicable and others omitted which an individual analyst may feel necessary for a specific assignment; ". . .information, therefore, should be presented only to the extent that they [sic] affect value" (Shenkel, 1967, p. 11). Space has required some abbreviation of the factors; the source of each has been included where more detail may be available. The sources referred to have also been shortened:

- A1 = AIREA, 1967, p. 10
- A2 = AIREA, 1978, Chap. 6
- A3 = AIREA, 1980, pp. 10-4 & 10-5
- B = Bielby, 1979, p. 5

- C = Christensen, 1976, pp. 3, 14, 17, 19 & 121-124
 H = Houston, 1976, pp. 5-6
 KB = Kinnard & Boyce, 1975, Chap. 6
 KC = Kahn & Case, 1977, pp. 71-73 & 76
 L = Lomax, 1976, p. 15
 M = May, 1953, pp. 40-46
 S = Stebbins, 1976, p. 46

Physical factors:

- area (KB, M)
- barriers to growth
 - man-made (A2, KB, KC)
 - natural (A2, KB, KC, M)
- climate (A2, KB, KC)
- covering
 - clear (M)
 - landscaping (C)
 - wooded (M)
- drainage (KB, M)
- nuisances and hazards (A2)
 - fog, smoke, smog, noises and vibrations
- relative to the rest of the city (A2)
- soil and subsoil conditions (A2, KB, M)
- topography (A1, A2, C, KB, KC, M)
- water (A2, M)

Economic factors:

Costs:

- building materials (A3, M)
- insurance (KB)
- labor (M)
- land (H)
- real estate taxes (H, KB)
- utilities (KB, S)

Financing:

- sources (A2, L, M, S)
- lender attitudes and rating (A2, KB)
- foreclosure rate (L, M)
- public and private debt load (M)

Hazards and nuisances (L, S)

- air quality (C)
- airplane noise (B)
- different uses (KB)
- environmental quality perceptions (C)
- "green belts" (KB)
- highways (KB, KC)
- industrial activities (B)
- natural features (KC)

- odors or smoke (B)
- rail lines (KB, KC)
- rodents (B)
- streets (KB)
 - impassable or need repair (B)
 - lighting (B)
 - noise (B, C)
 - patterns and street widths (A2, KB, M)
 - traffic (B, C)
- utility rights-of-way (KB)
- Land use (A2, KB, KC, L, M)
 - age and condition of improvements (A1, A2, B, KB, KC, L)
 - competition (KC)
 - extent built-up and density (A1, H, KB, KC, L, S)
 - form of buildings: height and width (C)
 - homogeneity and conformity (KB, L, S)
 - similar land uses (KB, L, M)
 - similar size, style and utility (KB)
 - housing stock (C)
 - new construction (A2, M)
 - growth of the neighborhood (A2, KC)
 - vacant land (A2)
 - occupancy and turnover (KB, L, S)
 - open space (C)
 - planning, zoning and restrictions (KC, S)
 - recreational facilities (C)
 - quality and price levels (H, KB, KC, L, M, S)
 - shopping facilities (C)
 - tenure (own versus rent) (A1, A2, B, KB, L, S)
 - types, trends and changes in use (A2, KB, M, S)
 - vacancies (A1, A2, L, M)
 - abandoned (B)
 - run-down (B)
- Life stage and trends (A1, L, S)
 - economic transition or infiltration (A1, KB)
 - geographic patterns of growth (KC)
 - neighborhood depreciation
 - physical deterioration (M)
 - functional obsolescence (M)
 - locational obsolescence (L, M, S)
- Location relative to (or distance from) and quality of:
 - access, ease of access (L, S)
 - central business district (A1)
 - churches and synagogues (KC, L, M)
 - direction of city growth, development patterns (KB)
 - employment centers (H, L)
 - commercial (C)
 - industrial (C)
 - open space (C)
 - recreational facilities (KC, L)
 - parks (A2)
 - movies (M)
 - residential (C)

- multi-family
 - single-family
- shopping (A1, A2, B, H, KC, L, M)
 - neighborhood center (M)
 - regional center (M)
 - downtown district (M)
 - service establishments (A2)
 - supporting facilities (KB)
- schools (A2, KC, M)
- transportation (A1, A3, KC, L, M)
 - airports (A3)
 - highway (A3, M)
 - port (A3)
 - public (A2, M)
 - rail (A3)
- Pedestrian mobility (C)
- Population
 - average family size (B, KC, M)
 - age characteristics (C, KC)
 - education levels (B, KB)
 - employment, unemployment and sources (B, KB, KC, M)
 - family income levels (A1, A2, A3, B, KB, KC, L, S)
 - migration characteristics (C)
 - neighborhood population trends (KB, KC)
 - number (KC)
 - occupations (A1, M)
 - school enrollment (M)
 - sexual characteristics (C)
 - stability of income (A3, M)
- Property sales prices and rental rates (A1, A2, B, C, KB, L, M, S)
 - maximum and minimum levels (M)
 - asking (M)
- Government factors:
 - Political climate (A3, M)
 - contemplated public improvements (M)
 - renewal (KB)
 - subsidy programs (A3)
 - Restrictions
 - building codes (A2, KB, KC)
 - deed restrictions (KC)
 - electrical (KB)
 - fire codes (KB)
 - housing codes (A3, KB)
 - planning (L, KB, KC)
 - plumbing codes (KB)
 - political boundaries (KB)
 - private (KB)
 - rent control (A3)
 - subdivision regulations (M)
 - zoning (A2, A3, KB, KC, L, M)
- Services
 - fire protection (B, KB)

- medical clinics (B)
- police protection (B, KB)
- public transportation (B, KC)
- recreation (KB)
- refuse collections (KB)
- schools (A1, KB, L)
- utilities (KC, L)
- Taxes and assessments (A2, KB, M)
 - real estate (M)
 - other taxes (M)
 - special assessments (A2)
 - delinquencies (M)

Sociological factors:

- Aesthetics (A2, H, KB, KC)
 - historic resources (C)
 - view opportunities (C)
 - visual attractiveness (C)
- Attachment to community (H)
- Attitude of occupants toward desirability of location (L)
- Automobile availability (C)
- Character (A1)
- Children's activities (A2)
- Civic action (A2)
- Civic groups (C)
- Civic pride (KB, M)
- Perceived cleanliness and maintenance of properties (C)
- Community and neighborhood organizations (A2)
- Crime (A2, B, H, M)
 - attitude toward law enforcement (M)
- Cultural institutions (L)
 - churches (A1, M, S)
 - libraries (M)
 - recreational facilities (A1)
 - schools (A2, B, H, M, S)
 - other educational institutions (A1, M)
- Cultural backgrounds (KB)
- Economic patterns (A2)
- Employment types, relief and charity (A2, M)
- Environmental considerations (H)
- Ethnic and national background (A2, C, KB, M)
- Historic background of the people (M)
- Homogeneity and compatibility (KB)
- Length of time as resident of neighborhood (C)
- Litter and trash (A2, B)
- Marriages and divorce trends (M)
- Nuisances and hazards (KB)
- Personal safety (C)
 - from crime
 - from traffic
- Political groups (C)
- Population characteristic trends (KB)
- Population densities (A2, KB)
- Pride of ownership and maintenance (KB, L, S)

- Privacy (C)
- Race (A2, B, C)
- Religion (A2)
- Religious groups (C)
- Reputation of the area (KB, L, S)
- Role in neighborhood (C)
 - resident
 - entrepreneur
 - worker
- Social background, groups and organizations (A2, KB)
- Social clubs (C)
- Thrift attitudes (A2)

May considers the social structure of the area important which is consistent with Boyce's definition, but again if market value is being estimated by the appraiser, only the social structure that may be perceived by the buyer is important in defining the neighborhood, and if he is coming from outside the area his knowledge will probably be less than someone moving within the same neighborhood. Also, the characteristics of the seller may reflect, to some degree, those of the buyer (Vandell, 1982, pp. 259-260) except for transitions the neighborhood may be going through. Here the broker may act as a proxy for the residents (Conversation with A. Downs, Fellow, Brookings Institution, August 6, 1982). Dilmore (1974) used broker delineations which resulted sometimes in entire municipalities being designated a neighborhood. Buyers, sellers and brokers refer to the "for sale" market; however, the viewpoint of the renter may differ from that of the owner.

Several variables for neighborhood analysis have been enumerated; most can be used in defining a neighborhood, too. Other variables are provided in the rental housing demand and supply equations of de Leeuw and Ekanem (1971b, p. 7).

Demand equation

$$S/H = g(Y, R/P)$$

Supply equation

$$R = f(C, O, H, S/H, V)$$

where

- S/H = quantity of housing services per household (i.e., space, heat, level of maintenance, nearness to work, etc.)
- Y = real income per household
- R = rent per unit of housing service
- P = price of goods other than housing
- C = price of capital inputs
- O = price of operating inputs
- H = number of households
- V = rental vacancy rate (an indication of disequilibrium in the housing market)

The above models are the only reference found to mass--the quantity of housing units sufficient to comprise a neighborhood. Mass is a variable that should be included as an economic factor of land use. The few row houses that remained after a highway was built near The Watergate in Washington, D.C., were an insufficient mass to maintain their residential character; the buildings were rezoned and are now used as offices. Consequently, the stability of a given market may be a function of its mass. In small homogeneous towns, the entire town may be treated as a unit thereby reflecting the mass of the market.

Neighborhood Stages

In describing a neighborhood the stage of its life should be specified for this is a factor whereby geographic neighborhoods can be compared. Shenkel (1978, pp. 84, 87), AIREA (1978, p. 94) and Kinnard and Boyce (1975) refer to the three stages of a neighborhood as (1) development and growth, (2) stability and (3) transition and decline.

These are periods of rising values, highest values and declining values, respectively. Boyce (1981) refers to the decline cycle being arrested by renewal and rehabilitation at which time the cycle is repeated (p. 147). May (1953) refers to the age analysis as an index to risk (pp. 79, 180-181). Stebbins (1976) states the neighborhood analysis should include future trends (p. 46). The life stage of the neighborhood also provides an indication of obsolescence. The "neighborhood" of neighborhood evolution, growth, stability and decline refers again to the physical environs of the property and the concept of neighborhood as a contiguous geographic area.

Neighborhoods Versus Suburbs

No discussion of neighborhoods would be complete without some consideration of the suburbs. Neighborhoods are treated by Steinlieb and Hughes (1974) as city phenomena to be contrasted with suburbia. Distinct neighborhoods or suburbs usually imply neighborhoods are in the older areas of cities and suburbs are in outlying communities (Russo, 1974, p. 133). Gans (1968) supports this image of the suburb: "The suburbs I conceive as the latest and most modern ring of the outer city, distinguished from it only by yet lower densities and by the often irrelevant fact of the ring's location outside the city limits" (p. 49). Goldfield and Brownell (1979) hold a similar view (p. 37). The first suburbs were at the end of trolley car lines outside Boston, Washington, D.C., and other cities and were built around the turn of this century. Chevy Chase, Maryland, was one such suburb built originally as a summer community from which the wage-earner commuted to work downtown. Commutation has always been a part of the suburb. Suburbs are "...settlements that were not self-contained communities in the traditional sense,

but places based on income, not ethnicity, where middle-class people who worked in the central city lived" (Russo, 1974, p. 64). But commutation was not always the desire of the person who moves to the suburb; his secret dream is to become financially independent of the distant job and replace it with a local job that pays equally well (Spectorsky, 1955, p. 265). This dream is being fulfilled as firms move to the suburbs today.

The creation of suburbs has permitted ". . .the physical separation of people in urban America, largely on the basis of income" (Russo, 1974, p. 133). As people move from cities into suburbs, the areas they leave behind become increasingly stratified economically. This is reflected in the geographic and social structure of cities today (Russo, 1974, p. 133).

Russo (1974) points out that the suburb as an "everywhere community" is a twentieth century creation (p. 174). A family can ". . .move from almost any suburb to almost any other of comparable class anywhere else in the United States. . . . With few exceptions, the products and services available and the residence itself were only slightly different" (Boorstein in Russo, 1974, pp. 174-175). The suburb has become an interchangeable facet of our housing scene somewhat like MacDonalds and Holiday Inn have become in their fields; they provide similar levels of service both in terms of quantity and quality wherever they are. The study of suburbanites is on a nation-wide basis rather than confined to separate localities (Rubin, 1982). Employees who are transferred regularly by their firms probably tend to live in suburbs and those who do not live in suburbs are those not likely to be transferred (Real Estate Research Corporation, 1964; Interview with J. West, Chairman of the Board, Real Estate Research Corporation, August 18, 1982). This is an area for further research.

Spectorsky (1955) has observed that people moving from a city to a suburb select their new location carefully; all suburban locations are not weighed equally (pp. 15, 25). McMichael (1951) contended that neighborhoods compete ". . .with other areas of competitive desirability to the same income group" (pp. 165-166). This may still be true in the city; it is also true in the suburb (Spectorsky, 1955, pp. 15, 25). Transportation, or rather the relative ease and acceptance of automobile travel, has changed not only the neighborhood-suburb relationship, but also the relationship of neighborhoods and suburbs to each other. Realtors frequently show prospective buyers homes in different subdivisions and different suburbs. Social structures also may include several suburbs as Tunnard and Pushkarev (1963) observed: "Because we are trying to allow unhampered movement, because we are concerned with time more than distance (so that 'nearer' in miles may actually be farther in time), we must abandon the traditional self-contained neighborhood idea, and plan for much larger, fluid, overlapping communities" (p. 318). This concept is closer to Kinnard's (1971) statement that the market area is not the same as neighborhood (p. 50). Russo (1974) has carried this further: "Thus, some observers detect a shift in definition from a geographic or physical emphasis to a social one. In this view, the urban dwellers' 'community' becomes an association of relationship scattered about the metropolis, divorced from neighborhood and street. If so, this shift would appear to apply only to middle-class urbanites. The poor and immigrants still have the old-fashioned type of community--whether in the form of the ghetto or the neighborhood" (p. 172).

This community or association of relationship from a real estate analyst's viewpoint is a collection of geographic areas that appeal to virtually the same market forces. The term "neighborhood" is inappropriate as is the term "suburb."

Market Settings, Not Neighborhoods

Throughout this study the term "neighborhood" has consistently been considered to be a contiguous geographic residential area, and the term "district" has been used to refer to contiguous geographic non-residential areas. Both may exist in older cities and in suburbia. But when examining the market for a specific property, most brokers agree that within suburbia geographically separated subdivisions compete with each other; the market perceives the same product is offered in each. The idea of restricting the analysis of physical, economic, governmental and sociological factors to a specific contiguous geographic area around a property appears reasonable if the market is contained within that area. Even where the market is spread among separated areas, a physical analysis of the environs of the property should be made as well as of the competing areas. The analysis of economic, governmental and sociological factors should then be made of all the areas.

The inclusion of competing areas provides a superior description of the market within which the property is being studied. It gives the analyst a better framework for the study of market trends and a wider area from which to draw both comparable data and market adjustments such as the time adjustment for changes in market conditions (Smith, 1976, p. 38).

The term "market setting" from the sociologists "social setting" is suggested as a term superior to "neighborhood" for market analysis

purposes. Lofland (1971) describes social settings as being ". . . alike in that they provide for those involved a similarity of circumstances of action. This similarity of circumstances of action is accessible to direct engagement by means of . . . participant observation" (p. 16). Analysts are concerned with "circumstances of action" or "reasons for being there" that may be translated into some monetary or economic manner. Therefore, the term "market setting" is suggested.

In his discussion of settings, Lofland (1971) describes a continuum of social phenomena from the microscopic to the macroscopic:

1. Acts. Action in a situation that is temporarily brief, consuming only a few seconds, minutes, or hours.
2. Activities. Action in a setting of more major duration--days, weeks, months--constituting significant elements of person's involvements.
3. Meanings. The verbal productions of participants that define and direct action.
4. Participation. Person's holistic involvement in, or adaptation to, a situation or setting under study.
5. Relationships. Interrelationships among several persons considered simultaneously.
6. Settings. The entire setting under study conceived as the unit of analysis. (pp. 14-15)

The fourth level, participation, is the neighborhood from the resident's viewpoint. This represents the definition usually given that the neighborhood is perceived only by its occupants. The fifth level of simultaneous relationships may reflect the social structure of "neighboring" in today's world. It may portray the social interactions between people or households in various non-contiguous locations and reflect a broader concept than "neighborhood." Since budgets may not permit interviews or observations of residents to obtain the individual definition of "neighborhood" on the part of the occupants or a study of

the relationships as suggested by Christensen (1976, p. xiv), the analyst must examine the setting.

The analyst usually lives in what he considers to be a "neighborhood." As an analyst he must regain his objectivity and divorce himself from his "neighborhood" concept in order to analyze the setting in terms of the market for the property.

The concept "market setting" permits the analyst to adjust the physical, economic, governmental and sociological environment to reflect the market for the property; the market for a storefront in an Italian neighborhood is as different than for the Empire State Building as the market for a million dollar residence may be broader than for one of forty thousand. In each example the environs of the subject property and each competing area must be defined and described in physical, economic, governmental and sociological terms. With large properties, the economic market may be international and may also include the non-real estate world of corporate municipal finance (e.g., bonds). Small towns may be a single market setting; the division into neighborhoods may be moot, for the town may have to be treated as a whole--a single market. Similarly, if two or more noncontiguous subdivisions represent the market setting, an appraiser should not feel constrained to the subdivision in which the subject property lies; he should feel comfortable obtaining comparable data from these other subdivisions in the market setting, too. Relatively simple statistical tests can be used to determine the comparability of areas.

A neighborhood can be examined from an asset and liability basis as owned by the city in which it lies (Scribner, 1976), but the analyst

cannot generalize about a city from the behavior of a few neighborhoods (Bradbury, Downs & Small, 1982, p. 213) or from a market setting.

Most of this discussion has referred to comparable or competing residential areas, but as indicated previously the term "market setting" may find even greater utility with the analysis of non-residential properties. For example, the analyst studying an existing or proposed hotel or motel needs to consider the market for transient space through the analysis of competitive facilities. The competition is frequently scattered with some located downtown and others near interstate or beltway intersections. With the analysis of resort hotels, the market may include several states. The traditional report format does not provide a place for this analysis; the land use is too specific to fit into regional, city or county analysis, and the locations are too scattered to be confined to a neighborhood analysis. What they comprise is a market setting the discussion of which can replace the neighborhood section. The same argument may also be applied to studies of shopping centers, industrial parks, banks, etc.

Lofland (1971) describes a setting as ". . .the temporally longest and spatially largest of observational-analytic units" (p. 47). The setting must be placed in a context; the description should begin with an overview placing it in the broader context of the city or metropolitan area, then become more specific (Lofland, 1971, pp. 47-48). Earlier the neighborhood variables were preceded by a definition of the neighborhood. Since a neighborhood was considered a contiguous area, its definition was first in terms of physical boundaries. A market setting may consist of a collection of non-contiguous areas or neighborhoods that require definition in terms of physical, economic,

governmental and sociological terms. These are ways that urban sub-areas may compete and, therefore, are ways in which market areas may be defined. Consequently, the same variables that applied to neighborhoods apply to market settings. The same caveat stated earlier about neighborhoods also applies to market settings, namely that description and analysis together ". . .constitute enlightening and balanced sociological work" (Lofland, 1971, p. 129).

The concept of a market setting consisting of competing comparable areas may, in fact, be a contiguous neighborhood if no comparable areas exist--none exist for Georgetown in Washington, D.C.--or it may include several non-contiguous subdivisions in the suburbs that were designed to appeal to the same market. The comparability of areas may be tested through (1) interviews of occupants which is usually not feasible, (2) interviews of brokers and salespeople who may be a proxy for the occupants, but who may also be influenced by their own biases, and (3) the use of statistics (McClave & Benson, 1979, Chaps. 10-13, 15-16; McClave & Mendenhall, in press; Mendenhall & McClave, 1981, Chaps. 10 & 14). These tests may provide a descriptive basis for analysis of the market setting. They may also aid in the analysis which either ". . .provides a static depiction of a social phenomenon or reports phases or sequences through which a phenomenon passes over the course of time" (Lofland, 1971, p. 15). In the analysis of a market setting, as with the analysis of a neighborhood, the analyst usually provides a static description, but places it within a dynamic framework of sequences involving forecasts of growth, stability or decline.

Hypothesis

It is the contention of this study that the term "market setting" is a better describer of the sub-section of the community within which real estate should be analyzed. Conversely, the term "neighborhood" is not considered as good a describer as "market setting." Consequently, the research question or null hypothesis which the study will attempt to refute is: "neighborhood" is a better describer of the sub-section of the community within which real estate should be analyzed than "market setting." The alternative hypothesis which would remain if the null hypothesis is rejected would be: "market setting" is a better describer of the sub-section of the community within which real estate should be analyzed than "neighborhood."

Method

The objective of this study is to demonstrate statistically the validity of the concept "market setting" and to illustrate how the concept "neighborhood" is more constraining, and therefore, statistically inferior to "market setting."

Research Design

The specific research strategy (Runkel & McGrath, 1972, p. 85) employed was a field study of a particular behavior system, namely of the towns of Guilford and Madison, suburbs of New Haven, Connecticut. The strategy involved a naturally occurring system. The research operation was unobtrusive since properties for sale as listed with a multiple listing service were used; no local interviews were conducted. Maximum concern was with the character of the behavioral system in the context of the setting.

An observed partition mode was used for the treatment of the variables wherein the investigator lets the variable vary within and between subsets in order to later be able to measure the values for each case (Runkel & McGrath, 1972, p. 69). Each variable was recorded as it occurred with no attempt to control any variable. The advantages of the observed partition mode for the treatment of variables is that it ". . . is the most flexible mode. It has high information gain, does not reduce scope of information, and prevents confounding" (Runkel & McGrath, 1972, p. 93).

The advantages and limitations of the field study strategy are

The investigator ends learning a lot about complex and meaningful behavior systems, but he does not know with high confidence just what he has learned. For those who wish to use a more rigorous strategy such as a laboratory experiment to dissect what happens naturally, a field study can be a matchless way of learning the variables, their ranges and combinations, that might reward study by more rigorous strategy. (Runkel & McGrath, 1972, p. 94)

Application

Listings of residences in the adjacent towns of Guilford and Madison, Connecticut, will be analyzed. The research question will be rejected, if (1) the listings cluster into market settings each consisting of several neighborhoods such that no significant difference exists between the neighborhoods in each setting, and (2) a significant difference exists between the settings.

Two types of statistical tests will be used to test the hypothesis. The first specific statistical test employed is cluster analysis in order to determine whether location in a specific town or community is a determinate or whether the same unit may be found in either town

studied. The SAS User's Guide: Statistics (SAS Institute, Inc., 1982b) describes cluster analysis:

The purpose of cluster analysis is to place objects into groups or clusters suggested by the data, not defined a priori, such that objects in a given cluster tend to be similar to each other in some sense, and objects in different clusters tend to be dissimilar. (p. 417)

The second type of statistical test employed is regression analysis. Through stepwise regression analyses the significance of town was studied. Then each town was divided into four separate areas or "neighborhood districts" to test by multiple regression analysis whether location in any area was significantly important.

Approximately 187 physical, economic, governmental and sociological factors of neighborhood description and analysis were enumerated earlier. A selection of these characteristics of the towns were compared. Rather than isolate sub-areas of each town for comparison with other sub-areas of that or the other town, a comparison of housing clusters was made to ascertain whether housing clusters into geographically discrete areas of whether both towns are included. The fact that such clusters include both towns is an indication that a "market setting" does exist in these two towns. The testing through regression analysis of whether location in either town is significantly different or whether significantly different neighborhoods exist was also conducted. Drawing upon the models of Rokeach (Sanford, 1979, pp. 2-3) and Chapin and Weiss (1965, p. 4) that observed behaviors are indicative of the value systems of the behavior which are then indicative of his self-concept, this study has considered similar observed behaviors to be indicative of similar value systems and self-concepts as they manifest themselves in real estate. The houses listed for sale thereby become

the proxy for their purchasers; and therefore, the listed homes are the actors or subjects of the study. The characteristics of the houses including asking prices and town location are observed behaviors or variables, and the real estate market system is the context in which they are studied.

Principal Results of the Investigation

The cluster analysis did not group the observations into geographically small sub-areas or neighborhoods. Instead it showed the market was both town wide and study-area wide. The regression analyses confirmed these conclusions that discrete neighborhoods do not appear to exist and that the market extends across the boundary separating the two towns.

Cluster analysis gave no support to the null hypothesis. Its support by regression analysis was weak. Therefore, the null hypothesis was rejected.

CHAPTER TWO METHOD

Any experiment drawn from, or statistical representation of, the real world must represent a simplified model of that world. Ferguson (1972, p. 5) refers to two forms of model analysis: (1) experimentation wherein statistical inference is used to draw conclusions about the real world and (2) logical argument wherein theoretical interpretation is used to draw conclusions about the real world. The latter or deductive method was used in the literature review, and the statistical or inductive method was used to test the hypothesis.

The method used in conducting this experiment consisted of first, identifying the communities in which data were readily available on a comparable basis; second, obtaining that data; third, locating each observation; and last, performing statistical tests on the data.

The Data

Data for two or more residential communities serving the same central city were sought. Preferably the communities would contain sub-areas that would be competitive with each other. Communities were sought which were considered by brokers to offer competitive housing at different price levels, where the income ranges were comparable, and which were generally accessible. Several real estate brokers were interviewed and consulted before one agreed to open her data files. The need to find two or more communities that appeared to offer competitive housing was explained, and the shoreline region of Connecticut along the

Long Island Sound and east of New Haven was chosen for the study. The region is served by one real estate board, the Shoreline Board of Realtors, which means (1) that the same brokers and sales people generally serve the entire region, (2) the data are input to the Multiple Listing Service (MLS) by brokers and salespeople in a relatively consistent manner; and (3) the data output is presented in a uniform manner for all towns in the region. Furthermore, the listings of all properties in the Multiple Listing Service are published weekly which should make all data relatively current. The multiple listing data for one period were made available to this study.

The Study Area: Guilford and Madison, Connecticut

The Shoreline region consists of six towns forming a generally rectangular area. Along the shore the towns from west to east are Branford, Guilford, Madison and Clinton. North Branford lies north of Branford and Killingworth lies north of Clinton. Only Guilford and Madison extend from the shore of Long Island Sound to the northern edge of the service area, a distance of approximately twelve to thirteen miles.

The principal east-west roads serving the Shoreline region are Interstate Route 95, U.S. Route 1 and State Route 80. (See Figure 2-1.) The first two parallel each other near the shore; the latter lies approximately seven miles inland. Interstate Route 95 is also known as the Connecticut Turnpike; U.S. Route 1 is also known as the Boston Post Road and follows the traditional route from colonial times that connected the communities along the shore to New York and Boston. Each town also is served by one north-south state route; in Guilford and

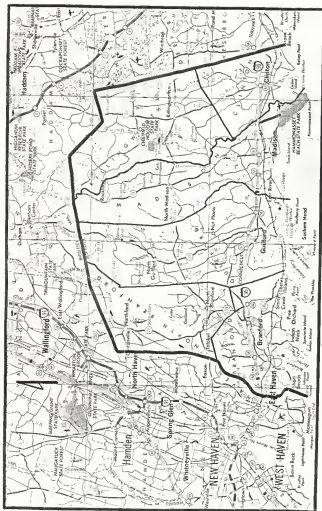


FIGURE 2-1: SHORELINE REGION
INCLUDING STUDY AREA OF GUILFORD
AND MADISON, CONNECTICUT

Madison these roads are both called Durham Road, State Route 77 in Guilford and State Route 79 in Madison.

The description of the cluster analysis procedure selected for testing the hypothesis does not limit the number of observations, but a limit is imputed in the comparison of the selected technique with other clustering techniques (SAS Institute, Inc., 1982 b, pp. 417-433). Methods designed to process large data sets refer to ". . .approximately 100 to 100,000 observations" (SAS Institute, Inc., 1982 b, p. 433). Sewall (1982) refers to large numbers of observations as being "more than 200 or so" and states such large numbers may be a disadvantage through the introduction of outliers (p. 5). During interviews with M.A. Sewall, Professor of Marketing, University of Connecticut (1982 and 1983), he indicated the maximum sample size is probably about 250 observations. Accordingly, this level was accepted as the maximum desirable. All together more than 600 houses were listed for sale in these six towns. The towns of Guilford and Madison with a combined total of 338 observations were selected as the study area. Some of the physical, economic and governmental characteristics of the two towns are illustrated in Table 2-1.

As Table 2-1 illustrates, the towns have many similarities. The 1980 population of the two towns is in approximately the same ratio as the land areas, the number of households, the number of dwelling units and total employment of the two towns. Both towns experienced major growth from 1960 to 1980, and it is expected that the rate of growth will decline significantly for the rest of this century. These figures indicate the towns enjoyed their greatest increases and have apparently reached a growth plateau at approximately the same time. After 1980,

TABLE 2-1
SELECTED COMPARATIVE STATISTICS
GUILFORD AND MADISON, CONNECTICUT

Characteristic	Guilford	Madison	Study Area
Land Area (Square Miles)	46.6 (56.4%)	36.0 (43.6%)	82.6 (100.0%)
Population - 1960	7,913 (63.4%)	4,567 (36.6%)	12,480 (100.0%)
1970	12,033 (55.2%)	9,768 (44.8%)	21,801 (100.0%)
1980	17,375 (55.3%)	14,031 (44.7%)	31,406 (100.0%)
1990 est.	18,250 (53.8%)	15,650 (49.8%)	33,900 (100.0%)
2000 est.	20,100 (54.0%)	17,150 (46.0%)	37,250 (100.0%)
Change - 1960-1970	+52.1%	+113.9%	+74.7%
1970-1980	+44.4%	+ 43.6%	+44.1%
1980-1990	+ 5.0%	+ 11.5%	+ 7.9%
1990-2000	+10.1%	+ 9.6%	+ 9.9%
Density (population per square mile)			
1960	169.8	126.9	151.1
1970	258.2	271.3	263.9
1980	372.9	389.7	380.2
1990	391.6	434.7	410.4
2000	431.3	476.4	451.0
Households - 1980	5,747 (55.4%)	4,620 (44.6%)	10,367 (100.0%)
Change - 1970-1980	+61.6%	+66.8%	N.A.
Persons per Household	3.00	3.02	3.03
Per Capita Money Income	\$7,070	\$7,107	N.A.

Table 2-1 (Continued)

Characteristic	Guilford	Madison	Study Area
Total Employment - 1980	3,920 (55.3%)	3,170 (44.7%)	7,090 (100.0%)
Manufacturing Employment	960	30	990
Percent of Population Employed	22.6%	22.6%	22.6%
Dwelling Units - 1970	3,967 (52.7%)	3,566 (47.3%)	7,533 (100.0%)
1980	6,321 (54.3%)	5,327 (45.7%)	11,648 (100.0%)
Change - 1970-1980	+59.3%	+49.3%	+54.6%
Population per Dwelling Unit - 1970	3.03	2.74	2.89
1980	2.75	2.63	2.70
Taxable Motor Vehicles - 1970	7,565 (55.8%)	5,999 (44.2%)	13,564 (100.0%)
1980	12,706 (55.0%)	10,379 (45.0%)	23,085 (100.0%)
Change - 1970-1980	+67.9%	+73.0%	+70.2%
Per Dwelling Unit - 1970	1.91	1.68	1.80
- 1980	2.01	1.95	1.98
Per Resident - 1970	0.629	0.614	0.622
- 1980	0.731	0.741	0.735
Real Estate Assessment Ratio	70%	60%	N.A.
Date of Last Revaluation	1975	1970	N.A.
Tax Rate (Mills) - Actual	38.75	50.0	N.A.
- Effective	27.1	30.0	N.A.

N.A. = Not available or not applicable.

Sources: Connecticut Department of Economic Development; U.S. Department of Commerce; Bureau of the Census; study area and percentage calculations by David Scribner, Jr.

population growth in both towns is expected to slow measurably. In 1960, Guilford, which is close to New Haven, was more densely settled than Madison, but by 1970 Madison had surpassed Guilford and is expected to stay ahead through the end of the century. The general consistency of both towns is similar: the average household size, the per capita money income, the percent of the population employed, and effective tax rate (actual rate times assessment ratio) are all similar.

Guilford and Madison are similar in more ways than listed above. Both front on the north shore of Long Island Sound and extend inland about the same distance, indicating both have approximately the same percentage of inland and shore oriented areas. The inland areas of both are rolling topographically and mostly wooded. Streams, lakes, and ponds are found throughout both. The only noticeable differences are the physical size of the towns, with Madison the smaller; their relative locations, with Madison further from New Haven (the dominant community in the region); and the population per dwelling unit where the figures indicate Madison has led Guilford in the shift to lower unit size.

Both towns are primarily bedroom communities serving the New Haven area. Housing in both towns is predominantly year-round and owner-occupied as is shown in Table 2-2. The distribution of housing is similar to the ratio of land areas of the two towns.

Census Tracts: Guilford and Madison, Connecticut

Both towns are part of the New Haven-West Haven Standard Metropolitan Statistical Area and were formerly part of New Haven County. The State of Connecticut abolished counties and the county level of government in 1960 and now consists of only 169 towns and cities. The county sheriffs and agricultural cooperative extension

TABLE 2-2
SELECTED HOUSING CHARACTERISTICS BY CENSUS TRACT
GUILFORD AND MADISON, CONNECTICUT
1980

Characteristic	Guilford		Madison		Study Area
	Census Tract	Amount	Census Tract	Amount	
Total Housing Units	1,901	1,297	1,941	2,421	
	1,902	1,424	1,942	2,906	
	1,903	3,600			
Total		6,321 (54.3%)		5,327 (45.7%)	11,648 (100.0%)
Year-Round Units	1,901	1,269	1,941	1,915	
	1,902	1,121	1,942	2,900	
	1,903	3,576			
Total		5,966 (55.3%)		4,815 (44.7%)	10,781 (92.6%)
Owner-Occupied Units	1,901	822	1,941	1,352	
	1,902	857	1,942	2,559	
	1,903	3,173			
Total		4,852 (55.4%)		3,911 (44.6%)	8,763 (75.2%)
% of all Occupied Units	1,901	67.1%	1,941	75.7%	
	1,902	78.3	1,942	90.3%	
	1,903	92.6			
Total		84.4		84.7	84.5%
Median No. of Rooms	1,901	6.5	1,941	6.8	
	1,902	6.8	1,942	7.6	
	1,903	6.8			
Total		N.A.		N.A.	N.A.

SOURCES: U.S. Department of Commerce, Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

service appear to be the only remaining vestiges of the county system. Although the U.S. Department of Commerce, Bureau of the Census still publishes data on a county basis, it has always drawn its Standard Metropolitan Statistical Area (SMSA) boundaries on city and town lines (Clawson and Stewart, 1965, p. 40).

The U.S. Bureau of the Census has divided Guilford and Madison into census tracts as is shown on Figure 2-2. The Connecticut Turnpike, Interstate Route 95, separates Guilford's two southern tracts (1901 and 1902) and one northern tract (1903). A railroad south of the Connecticut Turnpike divides Madison's southern tract (1941) and northern tract (1942). The information in Tables 2-2 through 2-8 has been presented by census tracts to see if any discernable patterns appear for ease in neighborhood identification.

As Figure 2-2 and the figures on Table 2-2 indicate, the northern tracts are both the largest physically and contain the most housing. They also contain the higher percentage of owner occupancy and the larger housing units. Tracts 1901, 1902 and 1941 are the most densely settled and show the lowest ratio of owner occupancy--between 67.1% and 78.3%. Tables 2-3, 2-4, and 2-5 show these tracts also contain some of the older (pre-1939) housing. Tables 2-3, 2-4, and 2-5 show that housing has continued to be built in all census tracts, although a decline has occurred in the southwestern part of Guilford in the last decade. More than 60% of existing housing built prior to 1939 is located south of the Connecticut Turnpike. Since 1940 in Guilford and 1960 in Madison, more than half the building has occurred in the larger northern tracts. With the predominance of newer housing in the northern tracts, it might be expected that housing values would be higher there;



FIGURE 2-2: CENSUS TRACTS
GUILFORD AND MADISON, CONNECTICUT

TABLE 2-3
YEAR STRUCTURE BUILT
OF YEAR-ROUND HOUSING UNITS
BY CENSUS TRACT
GUILFORD, CONNECTICUT
1980

Year	Census Tract		
	1901	1902	1903
1979 - 1980**	10 (0.8%) (3.2%)*	67 (5.9%) (21.5%)*	235 (6.5%) (75.3%)*
1975 - 1978	32 (2.5%) (2.9%)*	212 (18.6%) (19.4%)*	847 (23.6%) (77.6%)*
1970 - 1974	114 (8.9%) (12.5%)*	160 (14.0%) (17.6%)*	635 (17.7%) (69.9%)*
1960 - 1969	278 (21.7%) (26.6%)*	158 (13.9%) (15.1%)*	609 (16.9%) (58.3%)*
1950 - 1959	138 (10.8%) (17.4%)*	180 (15.8%) (22.8%)*	473 (13.2%) (59.8%)*
1940 - 1949	113 (8.8%) (22.4%)*	134 (11.8%) (26.5%)*	258 (7.2%) (51.1%)*
Before 1939	596 (46.5%) (43.8%)*	228 (20.0%) (16.7%)*	538 (15.0%) (39.5%)*
Total	1,281 (100.0%) (21.3%)*	1,139 (100.0%) (18.9%)*	3,595 (100.0%) (59.8%)*

*Percent of town.

**Until March 1980.

SOURCES: U.S. Department of Commerce, Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

TABLE 2-4
YEAR STRUCTURE BUILT
OF YEAR-ROUND HOUSING UNITS
BY CENSUS TRACT
MADISON, CONNECTICUT
1980

Year	Census Tract	
	1941	1942
1979 - 1980**	52 (2.7%) (28.1%)*	133 (4.5%) (71.9%)*
1975 - 1978	196 (10.3%) (24.5%)*	604 (20.6%) (75.5%)*
1970 - 1974	153 (8.1%) (20.2%)*	604 (20.6%) (79.8%)*
1960 - 1969	363 (19.1%) (27.6%)*	952 (32.4%) (72.4%)*
1950 - 1959	254 (13.4%) (55.8%)*	201 (6.8%) (44.2%)*
1940 - 1949	216 (11.4%) (69.9%)*	93 (3.2%) (30.1%)*
Before 1939	662 (34.9%) (65.5%)*	349 (11.9%) (34.5%)*
Total	1,896 (100.0%) (39.2%)*	2,936 (100.0%) (60.8%)*

*Percent of town.

**Until March 1980.

SOURCES: U.S. Department of Commerce, Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

TABLE 2-5
YEAR STRUCTURE BUILT
OF YEAR-ROUND HOUSING UNITS
GUILFORD AND MADISON, CONNECTICUT
1980

Year	Guilford Total	Madison Total	Study Area
1979 - 1980*	312 (5.2%) (62.8%)	185 (3.8%) (37.2%)	497 (4.6%) (100.0%)
1975 - 1978	1,091 (18.1%) (57.7%)	800 (16.6%) (42.3%)	1,891 (17.4%) (100.0%)
1970 - 1974	909 (15.1%) (54.6%)	757 (15.7%) (45.4%)	1,666 (15.4%) (100.0%)
1960 - 1969	1,045 (17.4%) (44.3%)	1,315 (27.2%) (55.7%)	2,360 (21.8%) (100.0%)
1950 - 1959	791 (13.2%) (63.5%)	455 (9.4%) (36.5%)	1,246 (11.5%) (100.0%)
1940 - 1949	505 (8.4%) (62.0%)	309 (6.4%) (38.0%)	814 (7.5%) (100.0%)
Before 1939	1,362 (22.6%) (57.4%)	1,011 (20.9%) (42.6%)	2,373 (21.9%) (100.0%)
Total	6,015 (100.0%) (55.5%)	4,832 (100.0%) (44.5%)	10,847 (100.0%) (100.0%)

*Until March 1980

SOURCES: U.S. Department of Commerce, Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

but as Tables 2-6, 2-7, and 2-8 illustrate, the predominantly older areas of tracts 1902 and 1941 have the highest median values. One reason for this might be that much of the construction around the village centers was housing built on single lots between existing houses and included custom built houses whereas much of the development of the northern tracts was in subdivisions as farmland became available for development.

Historic Patterns of Development

The settlement of older shore communities in New England usually started with the establishment of villages near the shore or along rivers since water was the usual means of transportation. As roads were built and improved, development spread inland through the establishment of newer villages. "New England was settled by groups who gathered in communities, not by individuals" (Goldfield and Brownell, 1979, p. 30). "The basic unit of settlement in Massachusetts was the town; in Pennsylvania it was the isolated family farm" (Baltzell, 1979, p. 119). In the early settlement of Connecticut, the settlers came from Massachusetts; the division into colonies in New England was not made until later. As a result the dominant form of early development was the village or hamlet of houses gathered around a church or meetinghouse and surrounded by fields and woods used to support the residences of the community. As development progressed and the strictures requiring residence location in a village were loosened, farmers began settling outside and between villages and a pattern of "infill" development was established. These two patterns, around a village center and between villages, continue to today and are the reason many towns have no single "best side" of town.

TABLE 2-6
HOUSING VALUE DISTRIBUTION
FOR SPECIFIED OWNER-OCCUPIED HOUSING UNITS
BY CENSUS TRACTS
GUILFORD, CONNECTICUT
1980

Value	Census Tract		
	1901	1902	1903
\$50,000	85 (12.8%)	91 (11.7%)	221 (8.1%)
\$ 50,000-\$ 59,999	95 (14.4%)	50 (6.4%)	217 (7.9%)
\$ 60,000-\$ 79,999	226 (34.1%)	160 (20.6%)	822 (30.0%)
\$ 80,000-\$ 99,999	152 (23.0%)	115 (14.8%)	809 (29.6%)
\$100,000-\$149,999	84 (12.7%)	200 (25.7%)	578 (21.1%)
\$150,000-\$199,999	10 (1.5%)	84 (10.8%)	65 (2.4%)
\$199,999	10 (1.5%)	77 (9.9%)	24 (0.9%)
Total Units	662 (100.0%) (15.9%)*	777 (100.0%) (18.6%)*	2,736 (100.0%) (65.5%)*
Median	\$73,800	\$94,100	\$82,400

*Percent of town total.

SOURCES: U. S. Department of Commerce Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

TABLE 2-7
HOUSING VALUE DISTRIBUTION
FOR SPECIFIED OWNER-OCCUPIED HOUSING UNITS
BY CENSUS TRACTS
MADISON, CONNECTICUT
1980

Value	Census Tract	
	1941	1942
\$50,000	94 (8.9%)	108 (4.6%)
\$ 50,000-\$ 59,999	86 (8.1%)	111 (4.8%)
\$ 60,000-\$ 79,999	217 (20.5%)	558 (24.0%)
\$ 80,000-\$ 99,999	176 (16.6%)	636 (27.4%)
\$100,000-\$149,000	309 (29.2%)	782 (33.6%)
\$150,000-\$199,999	126 (11.9%)	99 (4.3%)
\$199,999	51 (4.8%)	30 (1.3%)
Total Units	1,059 (100.0%) (31.3%)*	2,324 (100.0%) (68.7%)*
Median	\$94,800	\$91,100

*Percent of town total.

SOURCES: U. S. Department of Commerce Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

TABLE 2-8
HOUSING VALUE DISTRIBUTION
FOR SPECIFIED OWNER-OCCUPIED HOUSING UNITS
GUILFORD AND MADISON, CONNECTICUT
1980

Value	Guilford Total	Madison Total	Study Area
\$50,000	397 (9.5%)	202 (6.0%)	559 (7.4%)
\$ 50,000-\$ 59,999	362 (8.7%)	197 (5.8%)	559 (7.4%)
\$ 60,000-\$ 79,999	1,208 (28.9%)	775 (22.9%)	1,983 (26.2%)
\$ 80,000-\$ 99,999	1,076 (25.8%)	812 (24.0%)	1,888 (25.0%)
\$100,000-\$149,999	862 (20.6%)	1,091 (32.2%)	1,953 (25.8%)
\$150,000-\$199,999	159 (3.8%)	225 (6.7%)	384 (5.1%)
\$199,999	111 (2.7%)	81 (2.4%)	192 (2.5%)
Total Units	4,175 (100.0%) (55.2%)	3,382 (100.0%) (44.8%)	7,558 (100.0%) (100.0%)
Median	\$82,000	\$92,000	N.A.

SOURCES: U. S. Department of Commerce, Bureau of the Census (1982, 1983), totals and percentages in parentheses calculated by David Scribner, Jr.

New England towns are like counties in other parts of the United States; the town was the ". . . legislative and taxing unit. . ." (Baltzell, 1979, p. 120). These towns, such as Guilford and Madison, are actually townships in a New England sense which as Mumford (1961) explains, are unique:

The township is a political organization which encloses a group of towns, villages, hamlets, along with the open country area that surrounds them: it performs the functions of local government, including the provisions of schools and the care of local roads, without accepting the long-established division between town and country. Within the limits of the township--sometimes covering an area of a dozen or more miles in each direction--its inhabitants recognized the need for decentralized facilities, in the one room primary school house or the country general store. In the township pattern, the growth of population and social facilities was not confined to a single center: something like a balance was achieved locally, within a regional pattern equally balanced. (p. 332)

The development of the early New England communities was unique for they had a specific religious orientation. Goldfield and Brownell (1979) point out that "the church--or meeting house--was the focal point of the New England town for most of the seventeenth century" (p. 29). Proximity to church was a dominant force affecting all patterns of development.

The Massachusetts General Court decreed in 1635 that no dwelling could be built more than half a mile from the meetinghouse in any new town. Though this ruling was repealed five years later, the concept continued to affect patterns of social thought and thus patterns of town building. Even Hester Prynne, condemned for adultery in Nathaniel Hawthorne's The Scarlet Letter, remained at the edge of the town. (Goldfield & Brownell, 1979, p. 30)

Guilford was first settled in 1639 during the period that the Massachusetts General Court decree was in effect. Land for the town was purchased from Uncas, sachem of the Mohegan Indians, in 1641 and

development spread according to the thinking of the time. Madison was part of Guilford until 1826.

With the residences at the center of the community, the surrounding lands were divided and allocated to the settlers by the drawing of lots ". . .to ensure that each person obtained land no better and no worse than his neighbors" (Reps, 1970, p. 147) although larger families and wealthier people frequently received more and better land than others (Hart, 1975, p. 52; Goldfield & Brownell, 1979, p. 30). As population increased, mainly through immigration in those early years, newcomers were either given land from the supply or "hiving off" occurred in which groups of settlers left the existing town to form a ". . .new town on newly granted land nearer the frontier" (Reps, 1970, p. 151). This pattern of development was not unlike the medieval pattern of town growth in England and Western Europe with communities approximately one day's walk apart (Mumford, 1961, p. 314); however, in New England a greater equality existed among the settlers and, therefore, among the settlements.

Towards the end of the seventeenth century, church membership represented a smaller part of the population, and settlement restrictions were relaxed. Individual houses were located on the farm lands of their owners more in the style that exists today (Goldfield and Brownell, 1979, pp. 32, 77). The pattern of future development was established. It was a combination of locating at the edge of villages and of "infill" or locating between existing villages or rural housing.

When each village was established, most of the settlers were similarly wealthy; all were homeowners and farmers. They also tended to be literate. As the communities aged and prospered, professionals

(e.g., lawyers) and merchants changed the social structure of villages near the shore, but the development of the rest of the town occurred within the pattern previously established. Businesses and tradespeople located near the center of the villages with farmers on the outskirts, at first commuting to their fields and then settling on them. The town offices and older village centers of both Guilford and Madison lie south of the Connecticut Turnpike close to the shore; the town center of Guilford is close to the Whitefield House, the oldest house in Connecticut built in 1639. New farms were established between the villages as the town became developed.

Current Patterns of Development

Houses have continued to be built following the patterns established in the Seventeenth Century. Individual houses are being built among the existing houses in the more developed areas while groups of new houses are being constructed in subdivisions on what was formerly farmland between village centers. It is not unusual to find a subdivision road developed with homes selling for \$170,000 off an older road with houses priced at \$110,000 to \$130,000 (e.g., Five Fields Road off Horsepond Road in Madison).

This juxtaposition of different size houses has its base in the attitude for consensus and natural characteristics of the New England countryside. As the religious cause was replaced by a political cause, the town remained as the common cause or unifying theme and consensus its operating style. The early villages were ". . . small, isolated communities with a uniformity of purpose, (which) meant that their continued existence depended upon voluntary consensus, compromise, and a basic unity of opinion and action" (Russo, 1974, p. 35). The democratic

political behavior reflected the homogeneity of the community (Baltzell, 1979, p. 120, Russo, 1974, p. 30). When serious differences of opinion occurred in a section of a town, that part of the town separated and became a separate town. "Secession was simply another way towns kept their peace, harmony, and uniformity. . ." (Russo, 1974, pp. 35-36). Guilford was divided several times, some parts becoming individual towns such as Madison; other parts joining with other towns or sections separated from other towns to create new towns. "The Puritan community was consensual. . ." (Goldfield and Brownell, 1979, p. 75); every citizen was considered in the decision making process. The New England town meeting is still held in many communities and was a form of governing different than found elsewhere. As a result of these factors of attitude and behavior made manifest in terms of location and government, no single "best side" of town developed. S.D. Messner, Professor of Finance and Real Estate, University of Connecticut (interview, September 8, 1983), R.N. Symonds, Jr., Assistant Director, Comprehensive Planning Division, State of Connecticut Office of Policy and Management (interview, September 6, 1983) and J.B. Paesani, Assistant Director, Center for Real Estate and Urban Economic Studies, University of Connecticut (interview, September 6, 1983) all concur in this conclusion that no "best side" exists in many New England towns. "This is to say that a New Englander making \$25,000 a year does not live in terribly different circumstances from a New Englander making \$12,000. . . Both inhabit modest houses or apartments" (Garreau, 1981, p. 30).

Messner (interview, September 8, 1983) attributes much of the current location behavior to four factors: (1) the land has been relatively sparsely settled because land has been plentiful and

municipal water and sewer have not been needed; (2) artificial boundaries between communities within a town do not exist; (3) zoning is a relatively recent restriction; and (4) no social or ethnic concentrations occurred in most towns. The availability of land means most homes can be located on lots of one acre or more and the lack of municipal water and sewer require larger lots. This means that topography and woods tend to screen neighboring properties so that different size and style houses may locate near each other and "propinquity is not a critical factor" (Messner interview, September 8, 1983). If a land use (e.g., a drive-in movie theater) makes a location undesirable, a few hundred yards or a quarter mile away the location is again good. As a result there may be one or two undesirable areas in a town, but no clear-cut one, two or three most desirable locations (Paesani interview, September 6, 1983).

The fact that villages and hamlets are not incorporated and have no political boundaries means the town is considered as the smallest political unit. While education has been important throughout the history of New England--it was one of four pockets of literacy in the world in the 1820's (interview with educational interpreter, Old Sturbridge Village, MA, spring 1983)--the school district has not been a significant boundary. McEachern and Szama (1975) found ". . . that school districts and towns are one and the same" in Connecticut (quoted in McEachern, 1977, p. 23 fn). Today most rural towns in Connecticut have only one high school or share regional high schools, and the town is not divided into districts at that level. Guilford has one high school and two middle schools; Madison has one high school and one middle school.

Zoning provides boundaries in many communities, but zoning is relatively recent in Connecticut. Several communities in the State have no zoning today. Guilford and Madison both adopted zoning in 1953, and in both towns zoning tends to support the large lots. The average size of developed lots in Guilford 0.80 acres and in Madison 0.87 acres; the average size of zoned lots in the two towns is respectively 1.21 acres and 2.06 acres (McEachern, 1979, pp. 69-70).

The geographic distribution of housing throughout both the towns of Guilford and Madison, and throughout the combination of the two towns, the study area, reflects a similar consistency and homology or similarity attributable to a common origin. The lack of a "best side" of town was brought about by the early development patterns and consensual attitudes toward location and person. Subsequent development has been alongside the existing. It has reflected the effective housing demands for new housing of the period in which it was constructed. This growth has led to the juxtaposition of a variety of housing patterns, styles, and sizes. One measure of this diversity is the distribution of housing values illustrated by census tracts in Tables 2-6, 2-7, and 2-8. Houses in every census tract range from less than \$50,000 to more than \$200,000. The older areas of each town, tracts 1902 and 1941, have the highest median values indicating these areas have not deteriorated as they have aged, but rather have maintained their desirability. Between 60% and 90% of all housing is valued at \$60,000 to \$149,999, much of it between \$60,000 and \$100,000.

The Gini coefficient of concentration of housing values shows both towns are approximately equal in homogeneity. McEachern (1979) analyzed the variability of housing in Connecticut towns by computing the Gini

coefficient of concentration of housing values from the 1970 census. "The Gini coefficient of concentration is derived in such a way that the more uniform the housing values, the smaller the Gini coefficient. . ." (p. 29). The Gini coefficient was calculated as a measure of the exclusivity of each town, for the more homogeneous the housing in the town, the more exclusive it will be and the more a house will be valued. "The Gini coefficient theoretically can vary from zero, the case with perfect homogeneity, to one, the case of perfect heterogeneity" (McEachern, 1979, p. 47). McEachern (1979) studied 160 of Connecticut's 169 cities and towns, and the range of Gini coefficients was from 0.10 to 0.40 (p. 48) with Guilford and Madison falling near the middle of the range at 0.2483 and 0.2470, respectively (pp. 69-70); the similarity of these figures means both towns are relatively and approximately equally homogeneous. In McEachern's study (1979) the Gini coefficient was significant at the 0.10 level (p. 47). He concludes that ". . . a reduction by 0.10 in the Gini coefficient, ceteris paribus, will result in more than a \$1,000 increase in the median value of property in the town" (p. 48).

Because of this relative lack of variability in either town, it would be expected that housing throughout each town would be competitive rather than grouped in discrete sub-areas or neighborhoods. This aspect will be studied, and if it is found to be true, the hypothesis will be tested on the extent to which housing in each town competes with the other town--whether the market setting encompasses both towns or is confined to one and whether separate groupings exist in either town.

The Observations

The subjects observed in this study were houses listed for sale by the Shoreline Board of Realtors. In its book Shoreline: MLS of September 14, 1982, the Board included approximately 650 home listings in the six towns served by the board plus approximately 500 other listings of vacant land, commercial properties and properties in other communities. Approximately 175 house listings ranging in asking price from \$22,000 to \$375,000 were in Guilford and 163 from \$49,900 to \$250,000 were in Madison; a total of 338 listings from which 236 were selected for the study--133 (56.4%) in Guilford and 103 (43.6%) in Madison, which is in approximately the same ratio as the land areas and populations of the two towns.

Listings for less than \$50,000 and more than \$200,000 and houses containing more than 10 rooms were omitted in order to reduce the sample size. Then, listings with incomplete data and properties where major expenditures could be expected (i.e., the installation of a heating system) were omitted as were properties with extensive outbuildings and facilities (e.g., guest cottages, stables, horse training rings, etc.) and houses with more than one housing unit.

A detailed description of the data has been included in a discussion of the variables following this part of the study. In reviewing the listing data, it was noted that properties were all described as being in good, very good, excellent, superior, mint, top mint, and mint plus condition even when the listing indicated that extensive remodeling was needed; ten properties needing varying degrees of work were included in the study. Otherwise, condition was not considered. If a house had been renovated or remodeled, the remodeling

date, rather than the original date of construction, was given; when both dates were given, the most recent was used in calculating the age. No municipal sanitary sewer system exists in either town; all observations have cess pools or septic tanks except one by the shore with a holding tank. These differences were not considered important. Domestic water was provided by well or city water, which was noted.

The observations are scattered throughout the two towns. Their location was noted on a map used in the field, and location coordinates assigned for computer replication and to test for geographic patterns of the data. As might be expected, the properties with city water were generally in the southern part of both towns. Most properties with city water are located along the Boston Post Road and along other nearby main roads. In Guilford, other properties with city water are in isolated locations near the beach and north of the Connecticut Turnpike both east and west, but not along, Dunham Road. In Madison, two isolated sites with city water lie north of the Connecticut Turnpike; south of the Turnpike all but a few listings have city water.

The Variables

Nineteen characteristics of each observation were noted from the listing form and recorded for inclusion in the study. Two other variables, the X and Y coordinates of location, were calculated from the field map on which the data were located. A SAS procedure, "UNIVARIATE" (SAS Institute, Inc., 1982 a, pp. 575-583), was used to generate statistical descriptive data of the nineteen variables. The characteristics recorded and aspects of the recording were

<u>Characteristic</u>	<u>Remark</u>
Town	Whether Guilford or Madison
Asking Price	The figure current as of the date of the publication; many had been reduced and then the lowest figure was used.
Bedrooms	When a range such as 3-4 was given, the lower figure was used; the additional bedroom was usually a den.
Baths	The number of full baths and half baths were added (1 full bath plus 2 half baths = 2 baths).
Total Rooms	When a range such as 7-8 was given, the lower figure was used.
Stories and Basements	The number of habitable floors was estimated from the photograph and the description of rooms on each floor.
Construction	As given in the listing; stone was included with brick, and vinyl siding was included with aluminum siding.
Heat	The type of principal heating source was estimated from the description.
Fireplace	Whether the house had one or more fireplaces not the number of fireplaces.
Woodstove	If the house had at least one woodstove or a connection for a woodstove.
Air Conditioning	Whether the description mentioned central air conditioning.
Garage	The number of car spaces provided in a garage or, infrequently, a carport or shed.
Swimming Pool	Very few properties had a swimming pool; the type was noted from the description.
Age	The year of construction or year of remodeling, whichever was newer, was used. If the listing stated "older"

	a figure of 99 years was used unless an estimate could be made from the photograph.
Favorable Financing	Whether the listing stated the seller would give a loan or if a composite rate or other favorable financing was available.
Lot Size	Estimated from the dimensions or acreage or as given.
City Water	As given in the description, when both city water and a well were indicated, city water was recorded; when new houses included an allowance for a well, the well was considered as is.
Waterfront Lot	Whether the description mentioned a location on the waterfront or rights to a beach.

Data Limitations

The greatest limitation to the data is the way in which the data were originally recorded and the desire of salespeople to present their listings as favorably as possible. As noted earlier, the minimum condition of properties was given as good even though extensive remodeling was required. No survey was done of the individual sales offices submitting listings, but inconsistencies were noted, such as "on property" for type of sewer system.

The degree to which asking prices may be indicative of selling prices or of market value may be suspect. It is likely that some owners have insisted upon listing their properties at prices above the market and salespeople eager for listings have complied. Support for this contention is shown by the number of listings that showed price changes downward.

The Procedures

Two procedures were used to test the hypothesis. First, cluster analysis of the data was conducted, and second, regression analysis was employed. All statistical tests used SAS programs (SAS Institute, Inc, 1982 a, 1982 b).

Cluster Analysis

Cluster analysis is a statistical technique by which observations with greater similarity are clustered together. Marketing specialists have recognized cluster analysis as a way of defining market segments (Sewall, 1982, p. 1). No clear or single method of clustering was recommended by the literature (Eisenbeis, 1971, 1972; Richardson and Thalheimer, 1979; SAS Institute, Inc., 1982 b, p. 417; Sewall, 1982). The lack of satisfaction with existing programs was shown by the number of individual adaptations of existing programs that these sources discussed.

Clustering may be done on an "a priori" or "ex post" basis (Sewall, 1982, p. 1). With a priori cluster analysis, the observations are first clustered by the analyst into what appear to be homogeneous clusters, and then these clusters are tested to see how good the clustering was. Ex post clustering lets the statistical routine separate the observations into clusters. The ex post clustering method was used in this study.

Hierarchical clustering, rather than non-hierarchical clustering, was used to group the observations.

The advantage of the hierarchical approach is that it does not require any prior estimation of either the number of clusters expected or their probable characteristics. The difficulty is that assignments of individuals to clusters is accomplished sequentially without regard for the effects of

subsequent assignments. Small errors in initial assignments of individuals are not corrected and can have a cumulative effect that may lead to serious distortions in the final solution.

Non-hierarchical clustering does have the capacity to reassign individuals in order to improve the quality of an existing solution. Reassignments continue until a stable set of clusters is achieved. The limitation of nonhierarchical clustering is that an initial set of clusters (to be improved upon) is required. Although non-hierarchical computer programs are capable of generating an arbitrary set of initial assignments, research indicates that solutions are inferior to those based on initial clusters that have some external logic. (Sewall, 1982, p. 4)

A basic question in cluster analysis is how many clusters is sufficient or appropriate? Conceivably each observation can be its own cluster and then the number of clusters will equal the number of observations. Conversely, all observations could be grouped into a single large cluster. Although some criteria are given in the literature, the answer to the question of how many clusters is a matter of judgment. As a result, tests were run requesting groupings into 5, 9, 12 and 15 clusters.

The 19 variables obtained from the listings were processed first through the "cluster" procedure of SAS (SAS Institute, Inc., 1982 b, pp. 423-431). Second, the output from the "cluster" procedure was processed through the "tree" procedure of SAS where the request for the number of clusters was made. When all data were entered, the original clusters were based on the qualitative or discontinuous variables (i.e., waterfront, bathrooms, etc.), and the "cluster" procedure appeared to ignore asking price. In an attempt to force the importance of asking price as a dominant variable, the "cluster" procedure was then run with asking price as the only variable and then run through the "tree"

procedure with all 19 variables. The same process was used for the different tests at 5, 9, 12 and 15 clusters.

Runs of the data using an average linkage method of clustering were compared with those using Ward's method. While some differences in clustering were noted near the middle of the price range, the differences did not appear significant.

The output of each cluster was printed using the SAS "PLOT" procedure (SAS Institute, Inc., 1982 (a), pp. 629-646) and analyzed using the SAS "UNIVARIATE" procedure (SAS Institute, Inc., 1982 a, pp. 575-583). The geographic distribution of the observations in each cluster was examined through the "PLOT" procedure and utilized the X and Y coordinate variables previously measured. A limitation to cluster analysis is that the technique weighs all variables equally and groups observations according to those variables which are easiest to group around (interviews with S.E. Green, Jr. and Laurin Haffner, Statistical Consultants, Institute for Social Inquiry, University of Connecticut, September 1983 and with M.A. Seweall, Professor of Marketing, University of Connecticut during 1982 and 1983). Accordingly, the technique is not stable, for if one variable is changed, the clustering may be different. An attempt to weigh the asking price variable was done; however, the influence of price on the other variables or the effect of the other variables on each other was not separately analyzed or adjusted for.

A strength of the method employed is that no variable is considered as "dependent" as in regression. All variables are considered on an equally independent basis. Therefore, once asking price was separately treated, the "TREE" procedure treated asking price as equal to all the other variables.

Regression Analysis

Four separate techniques were used in analyzing the observations and testing the hypothesis by regression analysis. In all, the observations were geographically divided into sub-areas or "neighborhood districts." They are not considered "neighborhoods" because of the arbitrary nature of the division.

"Neighborhood districts." Each town was divided into four "neighborhood districts." The Connecticut Turnpike was used to divide the north portion from the south; Dunham Road, extending to the shore, was used to divide the east portion from the west. The north-south division follows the census division in Guilford and approximates the census division in Madison. The "neighborhood districts" were labeled alphabetically A through G as shown on Figure 2-3.

Stepwise regression including eight "neighborhood districts." The first procedure was stepwise regression that included the eight "neighborhood district" variables. The procedure also included, as independent variables, 18 of the original 19 variables obtained from the listings (the 19th, asking price, was the dependent variable), the X and Y location coordinate variables (making 20 main effect variables), and 240 second and third order variables. The interaction of the location coordinates, XY , was specified and added as a 21st term to the main effect variables. These 21 variables were then squared to provide a basis for a test for any curvilinear behavior of any variable (McClave and Benson, 1979, Chap. 13; Mendenhall and McClave, 1981, Chap. 6). This squaring produced 21 second-order variables. Then the second-order interaction of the main effect variables with each other was produced to allow for of non-parallel behavior. One-third order interaction term

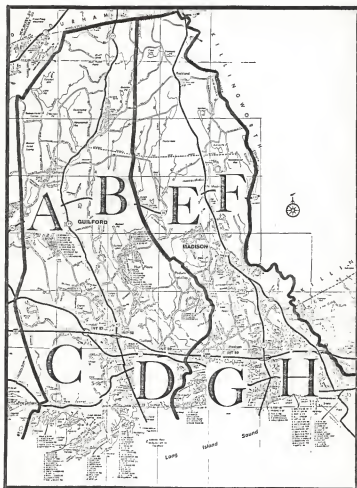


FIGURE 2-3 "NEIGHBORHOOD DISTRICTS," GUILFORD AND MADISON, CONNECTICUT

was used--the interaction of bedrooms, baths and total rooms. The SAS procedure "STEPWISE" (SAS Institute, Inc., 1982 b, pp. 101-110) was used with asking price the dependent variable to test the relevance of the different variables.

Stepwise regression forcing seven "neighborhood districts." The second procedure used was also stepwise regression. All the same variables used in the first procedure were included except one "neighborhood district" variable, H; the remaining seven were forced to be considered first through the "include=7" statement (SAS Institute, Inc., 1982 b, p. 104). Asking price remained the dependent variable.

Multiple regression model. The third procedure used was multiple regression. Seven neighborhood variables were included as independent variables together with the 19 independent main effect variables; the variable, town, was omitted since it and the "neighborhood districts" were redundant, and asking price was the dependent variable. The procedure tests to see if differences exist between the "neighborhood districts." The regression was run under the SAS "GLM" procedure (SAS Institute, Inc., 1982 b, pp. 139-199).

Duncan's multiple-range test. The fourth test was Duncan's multiple-range test which is an extension of the multiple regression procedure used above. Whereas the above procedure tells whether differences exist between "neighborhood districts," Duncan's multiple range test explains the nature of these differences. The eight "neighborhood districts" were combined into a single variable, N, which was included with the 19 independent main effect variables. Then through the "DUNCAN" option of the SAS "GLM" procedure (SAS Institute, Inc., 1982 b, p. 151), the Duncan multiple-range test was conducted for

the dependent variable "asking price" on the main effect means of N or the "neighborhood districts."

Summary

In this chapter the data and the procedures were described. Data were sought for more than one residential community with competitive housing oriented to the same central city. The shoreline region consisting of six towns east of New Haven, Connecticut, was examined, and the towns of Guilford and Madison were selected. The two adjoining towns have many similar characteristics. Guilford is slightly larger and closer to New Haven while Madison is slightly wealthier. An examination of census tracts indicates the housing in the northern portions of the towns tends to be newer. The median housing values are highest where the older housing is located. Because of the unique character of immobility that real estate possesses, the spatial characteristics including patterns of development were discussed preparatory to discussing the observations and variables. New England's unique settlement patterns have their roots in history and lead to multiple comparably good areas for settlement rather than the traditional "best side" of town.

Two hundred thirty-six listings of houses for sale ranging from \$50,000 to \$200,000 were selected from Guilford (133) and Madison (103). Nineteen variables were recorded for each. Location coordinate variables were calculated from a map.

These data were used to test the hypothesis through two procedures. Cluster analysis of 5, 9, 12 and 15 clusters was the first. Four separate techniques of regression analysis were used based on the division of each town into four sub-areas or "neighborhood districts."

Two techniques used stepwise regression, a third was multiple regression, and the fourth was Duncan's multiple-range test.

CHAPTER THREE RESULTS

This chapter will present the results in the order in which they were discussed in the prior chapter. The data will first be summarized and then the results of each experiment will be presented.

The Data

The results of the analysis of the data are presented in Table 3-1. In the following discussion of these findings, each variable has been treated separately; the form of the variable for computer use is included in parentheses. Following the towns and asking price variables, the physical characteristics of the houses are discussed, then their utilities and amenities, the age of the principal structure and whether favorable financing was available. Finally the site characteristics are discussed.

Town (TOWN). Two hundred and thirty-nine observations were used in the study; 133 or 56.4% were in Guilford and 103 or 43.6% were in Madison. The ratio of observations is identical to the relative sizes of the towns in land area. This similarity was not by design, but coincidental.

Asking price (ASKPRICE). The houses in Madison are somewhat more expensive than those in Guilford. The mean asking price for the observations in Madison is 3.5% higher than the average for the study area; the average for Guilford is 2.7% lower than the study area average. The data selected had a lower limit of \$50,000 and an upper

TABLE 3-1
DESCRIPTION OF DATA
BY VARIABLES
GUILFORD AND MADISON, CT

Variable	Guilford	Madison	Study Area
Observations	133 (56.4%)	103 (43.6%)	236 (100.0%)
Asking Price			
Mean	\$112,256	\$119,319	\$115,339
Standard Deviation	35,795	30,618	33,748
Coefficient of Variation	31.9%	25.7%	29.3%
Lowest	53,000	52,000	52,000
25% Q	185,250	96,000	89,900
50% Median	104,000	119,900	114,000
75% Q3	134,700	134,700	134,675
Highest	200,000	192,500	200,000
Range	147,000	140,500	148,000
Q3 - Q1	49,450	38,700	44,775
Mode	99,900 (7)	125,000 (5)	89,900 (7) 99,900 (7) 125,000 (7)
Bedrooms			
1	3 (2.3%)	0 (0.0%)	3 (1.3%)
2	15 (11.3%)	6 (5.8%)	21 (8.9%)
3	73 (54.9%)	42 (40.8%)	115 (48.7%)
4	41 (30.8%)	49 (47.6%)	90 (38.1%)
5	<u>1 (0.8%)</u>	<u>6 (5.8%)</u>	<u>7 (3.0%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Median	3 BR	4 BR	3 BR
Mode	3 BR	4 BR	3 BR
Bathrooms			
1.0	31 (23.3%)	9 (8.7%)	40 (16.9%)
1.5	15 (11.3%)	15 (14.6%)	30 (12.7%)
2.0	37 (27.8%)	14 (13.6%)	51 (21.6%)
2.5	39 (29.3%)	54 (52.4%)	93 (39.4%)
3.0	11 (8.3%)	10 (9.7%)	21 (8.9%)
3.5	<u>0 (0.0%)</u>	<u>1 (1.0%)</u>	<u>1 (0.4%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Median	2.0 Baths	2.5 Baths	2.0 Baths
Mode	2.5 Baths	2.5 Baths	2.5 Baths

Table 3-1 (Continued)

Variable	Guilford	Madison	Study Area
Total Rooms			
4	4 (3.0%)		4 (1.7%)
5	12 (9.0%)	5 (4.9%)	17 (7.2%)
6	21 (15.8%)	11 (10.7%)	32 (13.6%)
7	45 (33.8%)	25 (24.3%)	70 (29.7%)
8	38 (28.6%)	44 (42.7%)	82 (34.7%)
9	13 (9.8%)	18 (17.5%)	31 (13.1%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Median	7 Rooms	8 Rooms	7 Rooms
Mode	7 Rooms	8 Rooms	8 Rooms
Stories			
1.0	60 (45.1%)	32 (31.1%)	92 (39.0%)
1.5	23 (17.3%)	13 (12.6%)	36 (15.3%)
2.0	48 (36.1%)	58 (56.3%)	106 (44.9%)
2.5	2 (1.5%)	0 (0.0%)	2 (0.8%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Median	1.5 Stories	2 Stories	1.5 Stories
Mode	1.0 Stories	2 Stories	2.0 Stories
Basement			
Yes	105 (78.9%)	86 (83.5%)	191 (80.9%)
No	28 (21.1%)	17 (16.5%)	45 (19.1%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Construction			
Frame	102 (76.7%)	79 (76.7%)	181 (76.7%)
Brick	1 (0.8%)	1 (1.0%)	2 (0.8%)
Frame & Brick	4 (3.0%)	7 (6.8%)	11 (4.7%)
Brick & Aluminum	6 (4.5%)	0 (0.0%)	6 (2.5%)
Frame & Aluminum	20 (15.0%)	16 (15.5%)	36 (15.3%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Heat			
Gas	7 (5.3%)	4 (3.9%)	11 (4.7%)
Oil	89 (66.9%)	73 (70.9%)	162 (68.6%)
Electric	35 (26.3%)	26 (25.2%)	61 (25.8%)
Heat Pump	2 (1.5%)	0 (0.0%)	2 (0.8%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Fireplace			
Yes	94 (70.7%)	89 (86.4%)	183 (77.5%)
No	39 (29.3%)	14 (13.6%)	53 (22.5%)
	133 (100.0%)	103 (100.0%)	236 (100.0%)

Table 3-1 (Continued)

Variable	Guilford	Madison	Study Area
Woodstove			
Yes	15 (11.3%)	10 (9.7%)	25 (10.6%)
Flue	5 (3.8%)	1 (1.0%)	6 (2.5%)
No	<u>113 (85.0%)</u>	<u>92 (80.3%)</u>	<u>205 (86.9%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Air Conditioning			
Yes	7 (5.3%)	7 (6.8%)	14 (5.9%)
No	<u>126 (94.7%)</u>	<u>96 (93.2%)</u>	<u>222 (94.1%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Garage			
None	24 (18.0%)	8 (7.8%)	32 (13.6%)
1 Car	21 (15.8%)	19 (18.4%)	40 (16.9%)
2 Cars	86 (64.7%)	73 (70.9%)	159 (67.4%)
3 Cars	<u>2 (1.5%)</u>	<u>3 (2.9%)</u>	<u>5 (2.1%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Swimming Pool			
Above Ground	3 (2.3%)	0 (0.0%)	3 (1.3%)
Inground	5 (3.8%)	5 (4.9%)	10 (4.2%)
Indoor	1 (0.8%)	0 (0.0%)	1 (0.4%)
"Yes"	1 (0.8%)	0 (0.0%)	1 (0.4%)
None	<u>123 (92.5%)</u>	<u>98 (95.1%)</u>	<u>221 (93.6%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Age			
Mean	15 Years	15 Years	15 Years
25% 01	2 Years	5 Years	3 Years
Median	7 Years	11 Years	8 Years
75% 03	13 Years	17 Years	15 Years
Mode	0 Years	0 Years	0 Years
0 Years	22 (16.5%)	10 (9.7%)	32 (13.6%)
1- 5 Years	36 (27.1%)	24 (23.3%)	60 (25.4%)
6-10 Years	31 (23.3%)	17 (16.5%)	48 (20.3%)
11-20 Years	23 (17.3%)	36 (35.0%)	59 (25.0%)
More than			
20 Years	<u>21 (15.8%)</u>	<u>16 (15.5%)</u>	<u>37 (15.7%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Favorable Financing			
Yes	28 (21.1%)	27 (26.2%)	55 (23.3%)
No	<u>105 (78.9%)</u>	<u>76 (73.8%)</u>	<u>181 (76.7%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)

Table 3-1 (Continued)

Variable	Guilford	Madison	Study Area
Lot Size			
Mean	56,956 s.f.	54,708 s.f.	55,975 s.f.
Smallest	3,700 s.f.	5,000 s.f.	3,700 s.f.
25% Q1	21,780 s.f.	41,108 s.f.	30,642 s.f.
Median	43,560 s.f.	43,560 s.f.	43,560 s.f.
75% Q3	65,340 s.f.	59,243 s.f.	65,340 s.f.
Largest	435,600 s.f.	240,887 s.f.	435,600 s.f.
Range	431,900 s.f.	235,887 s.f.	431,900 s.f.
Q3 - Q1	43,560 s.f.	18,135 s.f.	34,698 s.f.
Mode	43,560 s.f. (12)	43,560 s.f. (15)	43,560 s.f. (27)
Other Most Freq.	65,340 s.f. (10)	52,272 s.f. (5)	65,340 s.f. (12)
	10,000 s.f. (6)	21,780 s.f. (3)	21,780 s.f. (9)
	21,780 s.f. (6)	47,916 s.f. (3)	87,120 s.f. (7)
	87,120 s.f. (5)		10,000 s.f. (6)
			52,272 s.f. (6)
Water			
City	28 (21.1%)	28 (27.2%)	56 (23.7%)
Well	<u>105 (78.9%)</u>	<u>75 (72.8%)</u>	<u>180 (76.3%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)
Waterfront Lot			
Yes	11 (8.3%)	3 (2.9%)	14 (5.9%)
Rights	15 (11.3%)	3 (2.9%)	18 (7.6%)
No	<u>107 (80.5%)</u>	<u>97 (94.2%)</u>	<u>204 (86.4%)</u>
	133 (100.0%)	103 (100.0%)	236 (100.0%)

limit of \$200,000 so the price ranges of the data in each town are similar. The 25th percentile (first quartile) and median price of the observations was higher in Madison, but the 75th percentile (third quartile) for each town was identical. The frequency with which the mode occurred is shown in parentheses. An asking price of \$99,000 occurred seven times in Guilford; \$125,000 occurred five times in Madison. Asking prices of \$89,900, \$99,000, and \$125,000 each occurred seven times in the study area.

The asking prices of observations in Madison show slightly less variability than those in Guilford as measured by the coefficient of variation. This question of relative variability will be examined further with other results.

Bedrooms (BEDRMS). The observations range from one to five bedrooms. The observations in Madison tend to contain more bedrooms than those in Guilford. Guilford contains three observations with one bedroom; Madison contains more; and Madison has six observations with five bedrooms; Guilford has one. This difference is also supported by the median and mode.

Bathrooms (BATHS). Again the observations in Madison are slightly larger than those in Guilford; 23.3% of the Guilford observations contain one bathroom versus 8.7% in Madison. Whereas the modal size of observations is the same, the median supports the greater number of bathrooms in Madison.

Total rooms (TOTRMS). The range is four to nine rooms. Guilford contains the only observations with four rooms. The frequency distribution, median and mode show that observations in Madison tend to be larger than those in Guilford.

Stories (STYS). Houses range in height from one to two and a half stories. Guilford has the only observations with two stories, but the median and mode both show houses in Madison tend to be taller.

Basement (BSMT). Although a greater proportion of observations in Madison (83.5%) have basements than do those in Guilford (78.9%), the majority of all observations have basements.

Construction (CONSTR). Five types of construction were noted and recorded. An identical proportion (76.7%) of the observations in either town was frame. The second most common type was frame and aluminum.

Heat (HEAT). Most observations (67%-71%) in either town are heated with oil. The second most common method (25%-26%) was electric.

Fireplace (FP). More than three-quarters of the observations in the study area have at least one fireplace with Madison (86.4%) having a higher ratio than Guilford (70.7%).

Woodstove (WDSTV). Most observations do not have either a woodstove or a connection for a woodstove. Of those that do have woodstoves, a slightly greater proportion is found in Guilford (11.3%) than in Madison (9.7%).

Air conditioning (AC). Air conditioning is infrequent. Only seven observations in each town had air conditioning.

Garage (GAR). Most observations had garage space for two cars. The incidence of no covered parking was more than twice as high in Guilford (18.0%) than in Madison (7.8%).

Swimming pool (POOL). Swimming pools are relatively rare, but when they occur they are more likely to be "inground" pools.

Age (AGE). The average age of the observations in both towns was fifteen years. The 25th percentile (first quartile), median and 75th

percentile (third quartile) all indicated older observations in Madison. Guilford had a greater percentage of observations built or remodeled in 1982. The largest grouping of observations in Guilford was one to five years old whereas the largest group was eleven to twenty years old. In both towns, the percentage of observations greater than twenty years old was approximately the same.

Favorable financing (FAVFIN). Less than one quarter of the observations in the study area offered favorable financing to enhance the sale. Those observations offering favorable financing were slightly greater in Madison (26.2%) than in Guilford (21.1%).

Lot size (LOT). The average observation in either town is approximately the same. The smallest observation in Guilford is 3,700 square feet; in Madison it is 5,000 square feet. The largest observations reflect the extra land for sale. The twenty-fifth percentile (first quartile) in Guilford is half an acre; in Madison it is nearly an acre. The medians are equal. By the seventy-fifth percentile (third quartile), the observations in Guilford are larger than those in Madison indicating a greater spread of lot sizes in Guilford. This is supported by the Q3-Q1 range.

Water (WATER). Approximately three-quarters of the houses in the study area receive their domestic water from wells. Twenty-eight observations in each town have city water.

Waterfront lot (WTRFR). More observations in Guilford (19.6%) fronted on water and had beach rights than in Madison (5.8%), but the majority in both towns had neither.

The Experiments

The results found through cluster analysis will be presented and then those from regression analysis.

Cluster Analysis

The experiment was conducted for 5, 9, 12, and 15 clusters. The results of each will be discussed in order.

Five clusters. The results of the experiment are summarized in Table 3-2. The 236 observations in the study area were distributed into five clusters with no overlap of asking price. The degree to which relative variability occurred in each cluster is measured by the coefficient of variation which is expressed as the standard deviation as a percentage of the mean. All clusters reflected less variability than did the study area. The least variability (3.56%) was represented by cluster 3, the middle cluster consisting of observations with asking prices of \$114,000 to \$129,000; the greatest variability (14.06%) was shown by cluster 5 which includes the lowest price observations (\$52,000 to \$93,500). Observations from both towns are included in each cluster.

Nine clusters. The results of the second experiment requesting nine clusters are summarized in Table 3-3. The 236 observations have been distributed among nine clusters with no overlap of asking price. The relative variability of observations in each cluster has been measured by the coefficient of variation. The smallest variability occurs in clusters one (2.15%), the highest priced group, and four (2.18%). The greatest variability is shown in cluster nine (8.25%), containing the lowest priced observations (\$52,000 to \$70,000). Observations from both towns were included in all clusters.

TABLE 3-2
SUMMARY OF ASKING PRICES BY CLUSTERS
USING WARO'S METHOD OF HIERARCHICAL CLUSTERING
AND TREE CLUSTERING TECHNIQUES
FOR 5 CLUSTERS

Cluster	Number of Observations			Asking Price			Standard Deviation of Coefficient of Variation
	Guilford	Madison	Total	Low	Hfgh	Mean	
1	14	10	24	\$164,500	\$200,000	\$182,121	\$10,965 6.02%
2	22	20	42	132,000	159,900	144,847	9,044 6.24
3	20	33	53	114,000	129,900	122,208	4,355 3.56
4	31	16	47	94,900	112,000	102,609	5,400 5.26
5	46	24	70	52,000	93,500	78,084	10,979 14.06
Study Area	133	103	236	52,000	200,000	115,339	33,748 29.26

TABLE 3-3
SUMMARY OF ASKING PRICES BY CLUSTERS
USING WARO'S METHOD OF HIERARCHICAL CLUSTERING
AND TREE CLUSTERING TECHNIQUES
FOR 9 CLUSTERS

Cluster	Number of Observations		Asking Price			Coefficient of Variation
	Guilford	Madison Total	Low	High	Mean	Standard Deviation
1	7	3	\$189,500	\$200,000	\$193,340	\$ 4,166
2	7	7	164,500	182,500	174,107	5,893
3	10	11	144,800	159,900	152,652	5,549
4	12	9	132,000	142,100	137,042	2,991
5	20	33	114,000	129,900	122,208	4,355
6	31	16	94,900	112,000	102,609	5,400
7	20	12	81,500	93,500	87,734	3,657
8	12	8	72,500	80,000	76,497	2,819
9	14	4	52,000	70,000	62,689	5,174
Study Area	133	103	52,000	200,000	115,339	33,748
						29.26

A comparison was made of the results from this second experiment with those from the first experiment of five clusters. Cluster one in the first experiment (\$164,500 to \$200,000) was divided into two separate clusters (\$164,500 to \$182,500 and \$189,000 to \$200,000). Cluster two of the first experiment (\$132,000 to \$159,900) was divided into two clusters in the second (\$132,000 to \$142,100 and \$144,800 to \$159,900). Clusters three and four in the first experiment are the same as cluster five and six in the second. Cluster five in the first experiment (\$52,000 to \$93,500) was divided into three clusters in the second (\$52,000 to \$70,000, \$72,500 to \$800,000 and \$81,500 to \$93,500).

Twelve clusters. The results of the third experiment requesting 12 clusters are summarized in Table 3-4. The 236 observations have been allocated to 12 clusters such that no overlap of asking price occurs. The relative variability of the observations in each cluster has been measured by the coefficient of variation. The smallest variability occurs in clusters six (1.29%) and eight (1.33%). The greatest variability is shown in cluster 12, containing the lowest priced observations (\$52,000 to \$70,000). Observations from both towns have been included in all clusters.

A comparison was made of the results from this third experiment with those from the second experiment of nine clusters. Clusters one and two in the second experiment remain unchanged in the third. Cluster three in the second experiment (\$144,800 to \$159,900) was divided into two clusters in the third (\$144,800 to \$150,000 and \$154,900 to \$159,900). Cluster four in the second experiment is the same as cluster five in the third. Cluster five in the second experiment (\$114,000 to \$129,900) has been divided into two clusters (\$114,000 to \$123,500 and

TABLE 3-4
SUMMARY OF ASKING PRICES BY CLUSTERS
USING WARO'S METHOD OF HIERARCHICAL CLUSTERING
AND TREE CLUSTERING TECHNIQUES
FOR 12 CLUSTERS

Cluster	Number of Observations			Low	High	Asking Price		Standard Deviation	Coefficient of Variation
	Guilford	Madison	Total			Mean			
1	7	3	10	\$189,500	\$200,000	\$193,340	\$ 4,166	2.15%	
2	7	7	14	164,500	182,500	174,107	5,893	3.38	
3	5	6	11	154,900	159,900	157,345	2,362	1.50	
4	5	5	10	144,800	150,000	147,490	2,388	1.62	
5	12	9	21	132,000	142,100	137,042	2,991	2.18	
6	9	16	25	124,500	129,900	126,182	1,628	1.29	
7	11	17	28	114,000	123,500	118,659	2,546	2.15	
8	9	8	17	106,700	112,000	109,047	1,450	1.33	
9	22	8	30	94,900	105,000	98,960	2,649	2.68	
10	20	12	32	81,500	93,500	87,734	3,657	4.17	
11	12	8	20	72,500	80,000	76,497	2,819	3.69	
12	14	4	18	52,000	70,000	62,689	5,174	8.25	
Study Area	133	103	236	52,000	200,000	115,339	33,748	29.26	

\$124,500 to \$129,900). Cluster six in the second experiment (\$94,900 to \$112,000) has been divided into two clusters (\$94,900 to \$105,000 and \$106,700 to \$112,000). Clusters seven, eight and nine in the second experiment are the same as clusters ten, eleven and twelve in the third.

Fifteen clusters. The results of the fourth experiment requesting 15 clusters are summarized in Table 3-5. The 236 observations have been divided into 15 clusters with no overlap of asking price. In Table 3-5 the data are presented as produced in the computer printout--not arrayed according to price. The relative variability of the observations in each cluster has been measured by the coefficient of variation. The lowest amount of variability occurs in clusters 15 (1.20%) and 6 (1.29%). The greatest variability is shown in cluster 13 containing the lowest priced observations (\$52,000 to \$61,900). Observations from both towns have been included in every cluster.

A comparison was made of the results from this fourth experiment with those from the third experiment of 12 clusters. Cluster one is the same in both. Cluster two in the third experiment (\$164,500 to \$182,500) has been divided into clusters 15 and two (\$164,500 to \$169,900 and \$174,900 to \$182,500). Clusters three, four, five, six, seven, eight and nine in the third experiment are the same in the fourth experiment. Cluster ten in the third experiment (\$81,500 to \$93,500) was divided into clusters ten and 11 in the fourth (\$81,500 to \$85,500 and \$87,900 to \$93,500). Cluster 11 in the third experiment is the same as cluster 12 in the fourth. Cluster 12 in the third experiment (\$52,000 to \$70,000) was divided into clusters 13 and 14 in the fourth (\$52,000 to \$61,900 and \$63,500 to \$70,000).

TABLE 3-5
SUMMARY OF ASKING PRICES BY CLUSTERS
USING WARO'S METHOD OF HIERARCHICAL CLUSTERING
AND TREE CLUSTERING TECHNIQUES
FOR 15 CLUSTERS

Cluster	Number of Observations			Low	High	Asking Price		Coefficient of Variation
	Guilford	Madison	Total			Mean	Standard Deviation	
1	7	3	10	\$189,500	\$200,000	\$193,340	\$ 4,166	2.15%
2	4	4	8	174,900	182,500	178,638	2,117	1.46
3	5	6	11	154,900	159,900	157,345	2,362	1.50
4	5	5	10	144,800	150,000	147,490	2,388	1.62
5	12	9	21	132,000	142,100	137,042	2,991	2.18
6	9	16	25	124,500	129,900	126,182	1,628	1.29
7	11	17	28	114,000	123,500	118,659	2,546	2.15
8	9	8	17	106,700	112,000	109,047	1,450	1.33
9	22	8	30	94,900	105,000	98,960	2,649	2.67
10	12	8	20	87,900	93,500	90,285	1,541	1.71
11	8	4	12	81,500	85,500	83,483	1,431	1.71
12	12	8	20	72,500	80,000	76,497	2,819	3.69
13	8	1	9	52,000	61,900	58,567	3,599	6.14
14	6	3	9	63,500	70,000	66,811	2,390	3.58
15	3	3	6	164,500	169,900	168,067	2,017	1.20
Study Area	133	103	236	52,000	200,000	115,339	33,748	29.26

Summary. Each experiment was run independently of the others. As the number of clusters increased, the coefficient of variation decreased; however, the greatest variability as measured by the coefficient of variation was always shown by the cluster containing the observations with the lowest prices.

As the number of clusters increased successive experiments resulted in the division of specific clusters into clusters with the same outside price parameters. This phenomenon is illustrated in Table 3-6 where the clusters are arrayed from the smallest to largest asking prices. In moving from five clusters to 15, every one of the five clusters created by the first experiment have been divided. Nevertheless, each of these towns is represented in every cluster produced by each of the four experiments.

Regression Analysis

"Neighborhood districts." The four regression analysis experiments were based on the division of each town into four sub-areas or "neighborhood districts." The number of observations, and asking price statistics for each "neighborhood district" are summarized in Table 3-7.

The price ranges of each "neighborhood district" overlap. The low price ranges from \$53,000 to \$61,900 among the four "neighborhood districts" in Guilford and from \$52,000 to \$69,900 for the four in Madison. With the exception of "neighborhood district" G, the low price each area in Madison is greater than the low prices in Guilford. The high price ranges in Guilford range from \$190,000 to \$200,000; in Madison they range from \$179,500 to \$192,500.

The range of average prices in Guilford is from a low of \$105,606 to a high of \$134,700; in Madison the range of \$112,268 to \$122,010 is fully contained in the range of the Guilford data.

TABLE 3-6
SUMMARY OF ASKING PRICES BY CLUSTERS
USING WARO'S METHOD OF HIERARCHICAL CLUSTERING
AND TREE CLUSTERING TECHNIQUES
FOR 5, 9, 12 AND 15 CLUSTERS

5 Clusters		9 Clusters		12 Clusters		15 Clusters	
Low	High	Low	High	Low	High	Low	High
\$ 52,000	\$93,500	\$52,000	\$70,000	\$52,000	\$70,000	\$52,000	\$ 61,900
						63,500	70,000
		72,500	80,000	72,500	80,000	72,500	80,000
		81,500	93,500	81,500	93,500	81,500	85,500
						87,900	93,500
94,900	112,000	94,900	112,000	94,900	105,000	94,900	105,000
				106,700	112,000	106,700	112,000
114,000	129,900	114,000	129,900	114,000	123,500	114,000	123,500
				124,500	129,900	124,500	129,900
132,000	159,900	132,000	142,100	132,000	142,100	132,000	142,100
		144,800	159,900	144,800	150,000	144,800	150,000
				154,900	159,900	154,900	159,900
164,500	200,000	164,500	182,500	164,500	182,500	164,500	169,900
						174,900	182,500
		189,000	200,000	189,000	200,000	189,000	200,000

TABLE 3-7
SUMMARY OF ASKING PRICES
BY NEIGHBORHOOD DISTRICTS
GUILFORD AND MADISON, CONNECTICUT

Neighborhood District	Number of Observations	Asking Price			Standard Deviation	Coefficient of Variation
		Low	High	Mean		
Guilford						
A	40	\$59,900	\$198,500	\$106,230	\$35,426	33.35%
B	56	58,900	200,000	105,606	28,856	27.32
C	24	53,000	190,000	134,700	39,904	29.62
O	<u>13</u>	61,900	195,000	118,008	42,144	35.71
	133	53,000	200,000	112,256	35,795	31.89
Madison						
E	35	67,900	189,500	121,980	26,533	21.75
F	21	69,900	192,500	122,010	30,371	24.89
G	18	52,000	190,000	116,956	38,448	32.87
H	<u>19</u>	67,700	179,500	112,268	31,063	27.67
	<u>103</u>	52,000	192,500	119,319	30,618	25.66
Study Area	236	52,000	200,000	115,339	33,748	29.26

The degree of relative variability of the observations in each "neighborhood district" is measured by the coefficient of variation which reflects the percentage that one standard deviation is of the mean. The coefficient of variation of each "neighborhood district" in Guilford and Madison is not greatly different than it is for either town or for the study area. They range from 27.32% to 35.71% in Guilford and from 21.75% to 32.87% in Madison.

Each of the four regression experiments that utilized these "neighborhood districts" will be discussed in the order in which they were presented in Chapter Two.

"Stepwise regression including eight "neighborhood districts."

This experiment indicated 28 variables of the 267 tested contribute to the change in asking price. The 36 and final step in the regression analysis gave a model with an R^2 of 0.7231 and an F value of 19.31 which was significant at the 1% level. The regression model used 28 degrees of freedom with 207 degrees of freedom remaining for error. The significance level for entry into the model was 0.15.

The "neighborhood district" variable C entered the model in the third step and resulted in increasing the R^2 from 0.3812 to 0.4330 with a concomitant change in F value of the model from 71.75 to 59.05 both of which were significant at the 1% level. The "neighborhood district" variable A entered the model in step 13 and raised the R^2 from 0.6064 to 0.6170 with a corresponding change in F value of the model from 28.63 to 27.51 both of which were significant at the 1% level. No other "neighborhood district" variables entered or were removed from the model.

A listing of the variables in the final model has been omitted since the level of significance for each variable is given for Type II

sum of squares ". . . which is the sum of squares that is added to the error sum of squares if that one variable is removed from the model" (SAS Institute, Inc., 1982 b, p. 106) and "for models involving interactions and nested effects, it is not possible to obtain a test of a hypothesis for a main effect free of parameters of higher-level effects with which the main effect is involved" (SAS Institute, Inc., 1982b, p. 235).

"Stepwise regression forcing seven "neighborhood districts." In this experiment the "neighborhood districts" A through G were forced into the first step (step zero) of the model. At this point in the analysis the model consisting of only these seven independent variables has an R^2 of 0.0779 and an F value of 2.75 which is significant at the 0.01 level. However, none of the independent variables was significant at the 0.01 level and only C was significant at the 0.05 level.

This experiment indicated twenty-four variables contribute to the change in asking price after forcing the "neighborhood district" variables into the model. The 28 and final step in the regression analysis resulted in a model with an R^2 of 0.7123 and an F value of 16.29 which was significant at the 1% level. The regression model used 31 degrees of freedom with 204 degrees of freedom remaining for error. The significance level for entry into the model was 0.15.

A listing of the variables in the final model has been omitted for the reasons given earlier. In the above discussion the model at step zero is a main effect model for which the statistics are valid (SAS Institute, Inc., 1982b, p. 237).

Multiple regression model. Least-square estimates were calculated for the sample of 236 observations. The results are shown below with

t-statistics in parentheses and significance levels denoted by asterisks:

ASKPRICE	=	19,346.37 (0.74)	+	7,331.59A (0.45)	-	6,343.60B (-0.50)
		+ 24,828.89C (1.55)	-	713.58D (-0.05)	-	1,637.13E (-0.19)
		+ 3,748.16F (0.46)	+	6,390.30G (0.65)	-	7,653.48 BEDRMS (-2.13)**
	+	18,185.93 8ATHS (4.75)*	+	6,611.56 TOTRMS (2.73)*	+	14,789.50 STYS
	-	2,940.61 BSMT (-0.68)	-	2,429.21 CONSTR (-2.25)**	-	3,188.34 HEAT (-1.04)
	+	6,553.32 FP (1.54)	-	750.38 WDSTV (-0.20)	+	865.02 AC (0.13)
	+	5,676.11 GAR (2.32)**	+	7,727.95 POOL (3.28)*	-	186.17 AGE (-2.41)**
	-	4,991.08 FAVFIN (-1.36)	+	0.20 LOT (5.81)*	+	12,750.45 WATER (2.67)*
	+	3,454.53 WTRFR (1.18)	+	63.17 X (0.03)	-	869.10 Y (-0.89)

* = Significant at 0.01 level.

** = Significant at 0.05 level.

The R^2 for the model was 0.5822 and the F value was 11.20 which was significant at the 1% level.

Duncan's multiple-range test. The eight "neighborhood districts" were combined into a single variable, N, and the multiple regression model was re-run with this as the only change. The model produced an R^2 of 0.5822 with an F value of 11.20 which was significant at the 1% level just as in the prior model. The variable N was significant at the 1% level. Grouping was based on the means of the asking price and a

threshold significance level of 0.05. The results are shown in Table 3-8.

The mean asking prices of "neighborhood districts" C, F, and E were not considered significantly different from each other at the 0.05 level of significance. Also, at the same level of significance the mean asking prices of "neighborhood districts" D, G, H, A, and B were not considered significantly different from each other and those in "neighborhood districts" F, E, D, G, and H were not considered to be significantly different from each other at the 0.05 level of significance.

TABLE 3-8
 "NEIGHBORHOOD DISTRICT" GROUPINGS
 BY DUNCAN'S MULTIPLE-RANGE TEST

Duncan Grouping		Neighborhood District	Mean Askprice	Number of Observations
	A	C	\$134,700	24
8	A	F	122,010	31
B	A	E	121,980	35
8	C	O	118,008	13
8	C	G	116,956	18
8	C	H	112,268	19
	C	A	106,230	40
	C	B	105,606	<u>56</u>
				236

Groupings are significant at the 0.05 level.

CHAPTER FOUR DISCUSSION

Following a restatement of the hypothesis, the results and findings will be discussed first in their own terms and then in relation to the hypothesis. The results and findings discussed will follow the same order presented in Chapters Two and Three. After a discussion of the specific results and findings, the implication of the study, suggestions for future work, and general conclusions will be presented.

The Hypothesis

The term "neighborhood" was defined in Chapter One as a contiguous subarea of a community and "market setting" was defined as one or a combination of two or more noncontiguous sub-areas or neighborhoods that are competitive. The hypothesis stated in Chapter One was:

It is the contention of this study that the term "marketsetting" is a better describer of the sub-section of the community within which real estate should be analyzed. Conversely, the term "neighborhood" is not considered as good a describer as "market setting." Consequently, the research question or null hypothesis which the study will attempt to refute is: "neighborhood" is a better describer of the sub-section of the community within which real estate should be analyzed than "market setting." The alternative hypothesis is which would remain if the null hypothesis is rejected would be: "market setting" is a better describer of the sub-section of the community within which real estate should be analyzed than "neighborhood."

The Data

In order to test the hypothesis, two communities offering competitive housing and oriented to the same centrality were sought.

The towns of Guilford and Madison, Connecticut were selected. Two hundred thirty-six homes with asking prices ranging between \$50,000 and \$200,000 listed with the Multiple Listing Service were selected; 133 in Guilford and 103 in Madison.

By selecting two adjacent communities many of the factors considered important to defining neighborhoods were held constant (e.g., climate, building costs, financing, etc.) Land use was held constant by selecting only observations that were single-family detached houses. Certain factors were allowed to vary to test the hypothesis: location within the study area, asking price, house size, some amenities and lot characteristics. Nineteen characteristics were recorded as variables.

The degree to which asking prices may be indicative of selling prices or of market value may be suspect. It is likely owners have insisted upon listing their properties at prices above the market, and brokers eager for listings may have complied. A number of listings showed downward price changes to support this supposition of possible overpricing. No indication was given of the amount of time any property had been on the market; several were still for sale a year later when a field visit was made.

Price groupings and gaps between prices were also noted. The number of modal prices in the study area reflects the extent to which those asking prices were favored. The groupings in the cluster analysis illustrate the gaps between asking prices; no houses are priced between \$182,500 and \$189,500, between \$169,900 and \$174,900, or between \$159,900 and \$164,500, whereas eleven observations lie between \$154,900 and \$159,900; six between \$164,500 and \$169,900; and eight between \$174,900 and \$182,500.

The question of the homogeneity of properties within the towns and to what extent the homogeneity of the sample of observations represents that of the towns was addressed through the use of the coefficient of variation. A comparison of the range and median asking price would be a good describer of the data in the sample, but the coefficient of variation was considered statistically superior for the standard deviation is a better describer of variation; it represents all the observations in a sample rather than just the extremes of a range. The coefficient of variation is a superior describer of variability relative to the mean.

How much variability is acceptable in a market segment? It is generally considered by appraisers that adjustments of comparables should not exceed 25%. Beyond that, the property is no longer comparable, for it usually represents a different market. Doubling this would give a range of 50% of the mean. A market segment represented by 25% above or below the mean would be equivalent to three standard deviations above and below the average. If three standard deviations divided by the mean equals 25%, then the coefficient of variation of one standard deviation divided by the mean should not exceed 8.33%. A coefficient of variation greater than 8.33% may reflect data from more than one market segment.

The coefficient of variation for the observations in Guilford (31.9%) is greater than for Madison (25.7%) indicating slightly greater homogeneity for the observations in Madison. These figures also indicate that each town also contains several separate market segments thereby indicating the data meet the criteria established for the communities.

While the observations for Madison may show more homogeneity than for Guilford with regard to price, other characteristics point up the fact that the two communities are different. The observations indicate that Madison appears to be the wealthier community although the data in Table 2-1 showed Madison's per capita money income in 1980 was on \$37, or 0.52% greater than it was for Guilford. The Gini coefficient developed by McEachern (1979, p. 48) for Madison was 0.0013, or 0.52%, less than for Guilford indicated only a slightly greater degree of homogeneity and exclusivity. The observations appear to show a greater degree of homogeneity, and therefore, exclusivity for Madison than for Guilford: the coefficient of variation for observations in Madison is 0.062, or 19.4%, less than it is for Guilford.

That the observations illustrate Madison is the wealthier community is supported by the following characteristics:

1. The observations in Madison have a greater number of bedrooms, bathrooms and total rooms than those in Guilford.
2. The observations in Madison tend to have more stories and are more likely to have basements than those in Guilford.
3. The observations in Madison are more likely to have fireplaces and less likely to have woodstoves than those in Guilford.
4. The observations in Madison are less than half as likely to provide no covered automobile parking than Guilford.

Other recorded characteristics such as heat and construction are virtually equal. Although not showing much difference, air conditioning and swimming pools appear to be insignificant. The average age of the observations was the same; the median age of the observations in Madison (11 years) exceeded that of the observations in Guilford (7 years).

Favorable financing was available only slightly more often in Madison than in Guilford. While some variations in lot size were evident in the observations the average and median lot sizes are not significantly different. The median lot size of one acre coincides with the predominance of one acre zoning and is further supported by the mode. The large lot size, availability of sufficient well water, and good soil for percolation characteristic of the coastal plain supports the statistics on domestic water. The only factor where the observations in Guilford appear to show a major difference over those in Madison is in waterfront location and rights to water frontage. The slightly wealthier aspect of Madison should indicate a greater proportion of observations from Madison in the more expensive clusters under cluster analysis. The observations were located throughout each town. The effect of location has not been analyzed at this point, but was considered in the statistical experiments.

This analysis of the data neither supports nor refutes the null hypothesis in a statistical sense. The data show several market segments exist in both towns. Based on the similarity of much of the data in both towns it appears that were either town to be considered a neighborhood and the combining of the two towns a market setting, then it would appear the null hypothesis would be rejected, for all recorded characteristics appear in observations in both towns. Certainly, the development patterns whereby no single "best side" of town occurs apparently indicate an entire town is a better describer than a sub-section of the town. The fact that Guilford and Madison were originally one town indicate an early commonality of development; that they split in 1826 indicates the commonality of purpose and unity had

waned. The data tend to support both these aspects indicating the extension of study area from one town into both towns should improve the analysis by providing more data in most market segments.

The Experiments

The hypothesis is a difficult one to test rigorously. Cluster analysis was first used to test it, and then regression analysis was used.

Cluster Analysis

The grouping of observations by cluster analysis reduced the variability more than the division of the towns into "neighborhood districts". Reducing variability was one of the goals of cluster analysis.

The fact that in every clustering experiment, into 5, 9, 12 and 15 clusters, observations from both towns were represented in every cluster. It appears from this descriptive analysis that this distribution lends support to the alternative hypothesis, for it indicates each of these market segments are represented in each town. Maps showing the location of clustered observations for the 9 cluster experiment are included as appendix to this study; they support these conclusions. Therefore, the combining of observations from both towns tends to increase the data base of every market segment (see Table 4-1).

An examination was made in Table 4-1 of the results of the experiment requesting 15 clusters. In this experiment the variability within clusters was reduced to a minimum. The smallest contribution to a cluster is one observation from Madison to cluster 13 containing the observations with the lowest asking prices (\$52,000 to \$61,900). The average asking price for the observations in Guilford (\$112,256) falls

TABLE 4-1
DISTRIBUTION OF OBSERVATIONS
BY TOWN FOR 15 CLUSTERS
ARRAYED FROM LEAST TO MOST EXPENSIVE
GUILFORD AND MADISON, CONNECTICUT

Cluster	Number of Observations		Total
	Guilford	Madison	
13	8 (88.9%)	1 (11.1%)	9 (100.0%)
14	6 (66.7%)	3 (33.3%)	9 (100.0%)
12	12 (60.0%)	8 (40.0%)	20 (100.0%)
11	8 (66.7%)	4 (33.3%)	12 (100.0%)
10	12 (60.0%)	8 (40.0%)	20 (100.0%)
9	22 (73.3%)	8 (26.7%)	30 (100.0%)
8	9 (52.9%)	8 (47.1%)	17 (100.0%)
7	11 (39.3%)	17 (60.7%)	28 (100.0%)
6	9 (36.0%)	16 (64.0%)	25 (100.0%)
5	12 (57.1%)	9 (42.9%)	21 (100.0%)
4	5 (50.0%)	5 (50.0%)	10 (100.0%)
3	5 (45.5%)	6 (54.5%)	11 (100.0%)
15	3 (50.0%)	3 (50.0%)	6 (100.0%)
2	4 (50.0%)	4 (50.0%)	8 (100.0%)
1	7 (70.0%)	3 (30.0%)	10 (100.0%)
Total	133 (56.4%)	103 (43.6%)	236 (100.0%)

SOURCE: Table 3-5

between clusters 7 and 8; the average asking prices for both Madison (\$119,319), and the study area (\$115,339) occur in cluster 7. Comparing the distribution between the towns of all observations shows that the six clusters (clusters 9-14) containing the least expensive observations also contain a greater proportion than the sample of observations from Guilford than from Madison which was expected. Of the remaining nine clusters only two (one and five) contain a greater proportion than the sample of observations from Guilford than from Madison. This distribution supports the expectation mentioned earlier in The Data section of this chapter that a greater proportion of observations from Madison should occur in the more expensive clusters. Surprisingly, the most expensive cluster, cluster one, shows a greater representation from Guilford than might have been expected.

Cluster analysis is a descriptive technique whereby a statistical level of confidence cannot be obtained for the results. Nevertheless, the clustering technique does (1) reduce the variability in the data and (2) indicate that for all market segments covered by the study, the analysis would be enhanced by including data from both towns. The expectation that some higher priced clusters would be mainly in Madison and that some lower priced clusters would be mainly in Guilford was not met. This descriptive technique does not support the null hypothesis.

Regression Analysis

Cluster analysis is a descriptive technique without statistical levels of significance. Also, in the manner that it was used cluster analysis weighs all variables as equally important thereby making cluster analysis an unstable technique. Therefore regression analysis was used, for it produces statistical levels of significance.

"Neighborhood districts." The "neighborhood districts" were somewhat arbitrarily drawn using principal roads and census tract boundaries as their basis. The variability of asking prices in each "neighborhood district" is still high; the creation of the "neighborhood district" does not significantly reduce the variability as cluster analysis did. These "neighborhood districts" do not appear to be better describers of the data than the town or the study area; therefore, it appears this analysis does not support the null hypothesis.

The data from the observations is in conflict with that from the census tract analysis. Although the "neighborhood district" boundaries are not exactly the same as those of the census tracts, the boundaries are similar enough that a comparison can be made (see Table 4-2).

TABLE 4-2
COMPARISON OF CENSUS TRACTS
AND "NEIGHBORHOOD DISTRICTS"
GUILFORD AND MADISON, CONNECTICUT

Town	Census Tract	Median Housing Value	"Neighborhood District"	Mean Observation Asking Price
Guilford	1901	\$73,800	C	\$134,700
	1902	94,100	O	118,008
	1903	82,400	A	106,230
			8	105,606
Madison	1941	94,800	G	116,956
			H	112,268
	1942	91,100	E	121,980
			F	122,010

The southwest corner of Guilford had the lowest median housing value in 1980, but the highest average asking price of the observations in 1982. The other areas in Guilford were in the same relative order.

In Madison, the median and mean figures are each not much different by areas, but the medians and means are in reverse order.

Support for these "neighborhood districts" in the following statistical tests would support the null hypothesis that all "neighborhood district" mean asking prices are equal. If location in any "neighborhood district" is not statistically significant, there is evidence the alternative hypothesis that at least two means differ would be true.

Stepwise regression including eight "neighborhood districts". Only two "neighborhood district" variables, C and A, entered the model. "Neighborhood district" C has the highest mean asking price; A has the second lowest mean asking price. The fact that C entered near the beginning of the analysis indicates location in that "neighborhood district" may be important.

Stepwise regression forcing seven "neighborhood districts." The "neighborhood districts" explain 7.8% of the change in asking price. Of the seven forced into the model only C was significant at the 0.05 level. This tends to support location in "neighborhood district" C as important, but the support is weak.

Multiple regression model. None of the "neighborhood district" variables was significant at the 0.05 level. "Neighborhood district" C had the highest t value which is consistent with prior findings, but it was not significant at the 0.05 level.

The signs and amounts of the "neighborhood district" coefficients are interesting. The positive signs of "neighborhood districts" A, C, F, and G indicate, ceteris paribus, that locating in any of these "neighborhood districts" will increase the asking price above that for

"neighborhood district" H which was omitted from the model. The increase for locating in each of these "neighborhood districts" A, C, F and G, ceteris paribus, is respectively: approximately \$7,332; \$24,829; \$3,748; and \$6,390. Conversely, the negative signs of "neighborhood districts" B, D, and E indicate that a location in any of these "neighborhood districts" will, ceteris paribus, reduce the asking price below that for "neighborhood district" H. The reduction for locating in each of these "neighborhood districts" B, D, and E, ceteris paribus is respectively: approximately \$6,344; \$714; and \$1,637.

The results of this experiment indicate the following changes in asking price, ceteris paribus, for location in the "neighborhood districts" relative to "neighborhood district" H are shown in Table 4-3.

TABLE 4-3
RELATIVE CHANGES IN ASKING PRICES,
CETERIS PARIBUS, FOR LOCATING IN
DIFFERENT "NEIGHBORHOOD DISTRICTS"
COMPARED WITH "NEIGHBORHOOD DISTRICT" H

"Neighborhood District"	Ceteris Paribus Change in Asking Price
C	+\$24,829
A	+ 7,332
G	+ 6,390
F	+ 3,748
H	-0-
D	- 714
E	- 1,637
B	- 6,344

The list in Table 4-3 also indicates, ceteris paribus, the relative desirability of the individual "neighborhood districts." While the list indicates some differences between the "neighborhood districts, the fact that none of the "neighborhood district" variables was significant at the 0.05 level, the null hypothesis is rejected by this experiment.

Duncan's multiple-range test. The prior experiment showed that separately the "neighborhood districts" were not statistically significant, collectively they are significant.

The Duncan's multiple-range test indicates that the mean asking price of "neighborhood district" C is significantly greater at the 0.05 level than the mean asking price of "neighborhood districts" D, G, H, A, and B, and the mean asking price of "neighborhood districts" F and E are significantly greater at the 0.05 level than the mean asking price of "neighborhood districts" A and B. This is not strong support for neighborhoods and the null hypothesis since only two differences were noted. The significance of all other factors remained the same.

Table 4-2 shows the "neighborhood district" representing the southwest corner of Guilford has the highest average asking price, but the corresponding census tract has the lowest median housing value of the study area. That and the variability of the "neighborhood districts" reduces the validity of the test.

Summary of the Experiments

The cluster analysis reduced the variation of the observations at each level of clustering: 5, 9, 12, and 15 clusters. At each level, both towns were represented in every cluster thereby refuting the null hypothesis.

TABLE 4-4
CORRELATION MATRIX
OF SELECTED VARIABLES
STUDY AREA

	TOWN	ASK- PRICE	BEORNS	BATHS	TOT- RMS	STYS	BSMT	CONSTR	HEAT	FP	WOSTV
TOWN	1.000										
ASKPRICE		1.000									
BEORNS			1.000								
BATHS				1.000							
TOTRMS					1.000						
STYS						1.000					
BSMT							1.000				
CONSTR								1.000			
HEAT									1.000		
FP										1.000	
WOSTV											1.000

Significance level of r :
0.01 significance level, r .170.
0.05 significance level, r .127.

Table 4-4 (Continued)

	AC	CAR	POOL	AGE	FAVFIN	LOT	WATER	WTRFR
TOWN	.032	.128	-.026	.007	.061	-.023	.071	-.194
ASKPRICE	.085	.292	.143	-.226	-.054	.261	.088	-.077
BEDRMS	.035	.329	.089	-.166	.014	.049	-.031	-.024
BATHS	.062	.405	.032	-.355	.044	.117	-.069	-.101
TOTRMS	.001	.401	.092	-.211	.048	.050	.003	-.038
STYS	-.001	.119	.034	.026	-.034	.034	.018	-.119
BSMT	-.015	.190	.071	-.052	.038	.089	-.186	-.085
CONSTR	.048	.106	.136	-.036	.004	-.048	-.047	.053
HEAT	-.122	-.018	.051	-.179	-.086	-.041	.074	-.092
FP	.049	.269	.011	-.087	.008	.128	-.153	-.104
WOSTV	-.050	-.020	.043	-.067	.056	.008	-.088	-.067
AC	1.000	.165	.125	-.079	.031	.122	-.098	-.062
CAR		1.000	.054	-.241	.068	.062	-.087	-.241
POOL			1.000	-.008	.014	.014	-.048	-.092
AGE				1.000	.065	.045	.148	.031
FAVFIN					1.000	-.030	-.048	-.047
LOT						1.000	-.287	-.130
WATER							1.000	.020
WTRFR								1.000

The geographic grouping of observations into "neighborhood districts" failed to reduce substantially the variability of observations. The two stepwise regression experiments indicated one "neighborhood district" was significant at the 0.05 level. The multiple regression models indicated the "neighborhood districts" were not individually statistically significant, but grouped together they were significant at the 0.01 level. Duncan's multiple-range test indicated weak support for the neighborhood district.

The support for the null hypothesis by regression analysis is very weak; no evidence supports the null hypothesis.

Implications of the Study

The hypothesis is difficult to test rigorously. The experiments approach the subject in two ways: cluster analysis and regression analysis. The rejection of the null hypothesis indicates, for the data analyzed, that a real estate analyst and appraiser would improve his data base, and therefore his analysis, if he extended his study area beyond the neighborhood to the market setting of competitive sub-areas.

The experiments also indicate the analyst should be cognizant of the patterns of development of the community. The pattern in rural New England towns was one that treated locations as essentially equal precluding a single "best side" of town. Therefore, "neighborhoods" in the traditional sense do not exist in these towns; the town itself becomes the neighborhood, and the analyst would do well to look throughout the town for comparable or competitive data before extending the search to other towns.

Suggestions for Future Work

This study was limited to the analysis of two adjacent rural towns in New England. The experiments might be conducted including other adjacent towns. The hypothesis should also be tested in more urban surroundings and in areas outside New England and subject to different patterns of development.

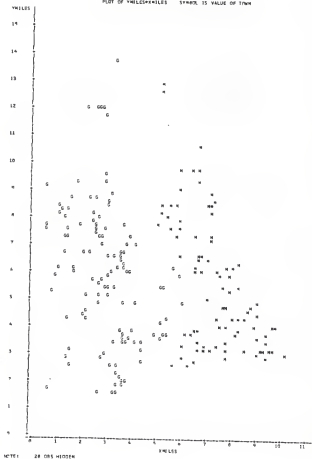
More sophisticated analysis of cluster analysis should be conducted to examine the trade-offs of property characteristics within certain clusters in these behavioral settings. Asking price was the dominant variable around which the clusters were constructed. Its importance was also recognized by making it the dependent variable in the regression analysis. The correlation matrix in Table 4-4 shows that asking price correlates significantly with eight variables: bedrooms, bathrooms, total rooms, number of stories, garage size, swimming pool, age, and lot size.

The study has been directed toward the analysis of residential real estate, but its thesis may have greater importance to income-producing property. Traditionally, competitive income-producing uses (e.g., motels, apartment houses, office buildings, etc.) are located in competitive areas which belie traditional neighborhood analysis. The null hypothesis should be tested in these systems, too.

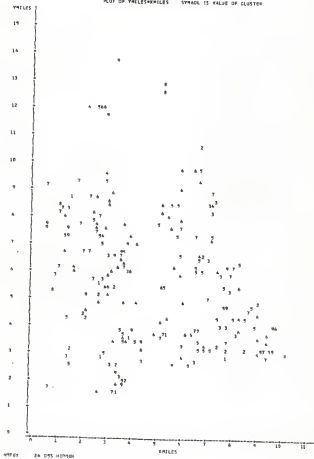
Other statistical tools, such as discriminant and factor analysis, should be examined to test the hypothesis, for as Table 4-4 indicates, the interrelationship of the variables should be examined further.

APPENDIX

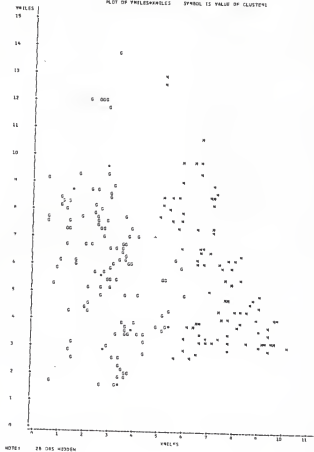
LOCATION OF OBSERVATIONS
GULFORD AND MADISON, CONNECTICUT
PLOT OF MILES/MILES SYMBOL IS VALUE OF TOWN



LOCATION OF CLUSTERED OBSERVATIONS
 DEERPOD AND REGION, CONNECTICUT
 PLOT OF YMELESXMIILES SPREAD, IS VALUE OF CLUSTER

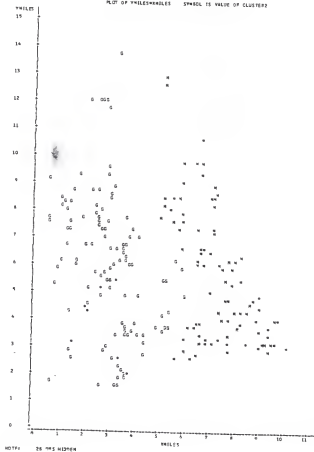


LOCATION OF CLUSTERED OBSERVATIONS
 READING IN ALL FOUR OBSERVATION
 DIRECTION AND POSITION OBSERVATION
 CLUSTER 1 OF 6 CLUSTERS
 PLOT OF WHILES/KNOWLES SYMBOL IS VALUE OF CLUSTERS



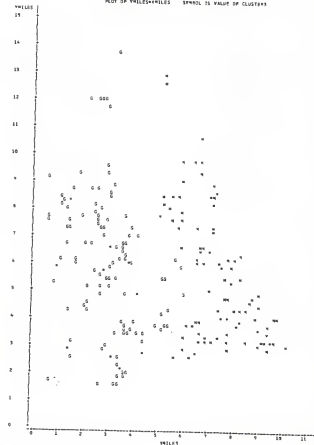
LOCATION OF CLUSTERED OBSERVATIONS
 RELATIVE TO ALL OTHER OBSERVATIONS
 WILFORD AND MADISON, CONNECTICUT
 CLUSTER 2 OF 4 CLUSTERS

PLOT OF WHITESPACES SYMBOL IS VALUE OF CLUSTER



LOCATION OF CLUSTERED OBSERVATIONS
 RELATIVE TO ALL OTHER OBSERVATIONS
 WITHOUT ANY ADDITIONAL CORRELATION
 CLUSTER 3 OF 4 CLUSTERS

PLOT OF MILES*MMILES SYMBOL IS VALUE OF CLUSTER

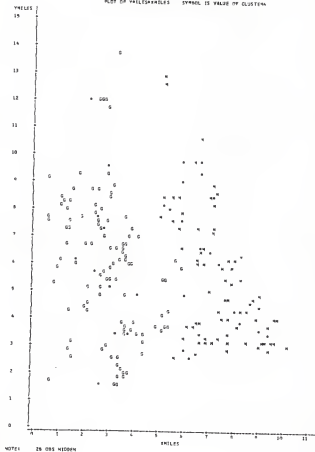


NOTE: 28 155 112224

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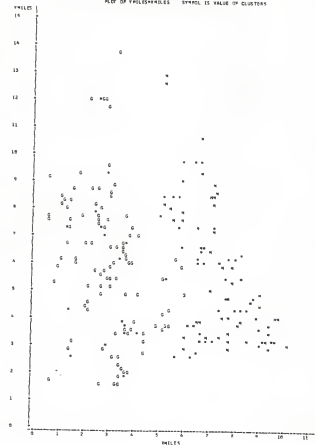
LOCATION OF CLUSTERED OBSERVATIONS
RELATIVE TO ALL OTHER OBSERVATIONS
GROUPS AND NUMBER OF CLUSTERS
CLUSTER # OF CLUSTERS
PLOT OF VARIABLES      SYMBOL IS VALUE OF CLUSTER

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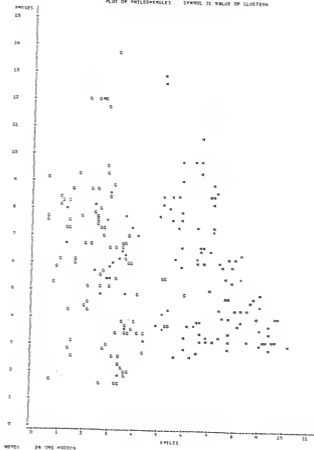


LOCATION OF CLUSTER OBSERVATIONS
 RELATIVE TO ALL OTHER OBSERVATIONS
 GROUPED AND ANALYZED COLLECTIVELY
 CLUSTER 8 OF 4 CLUSTERS

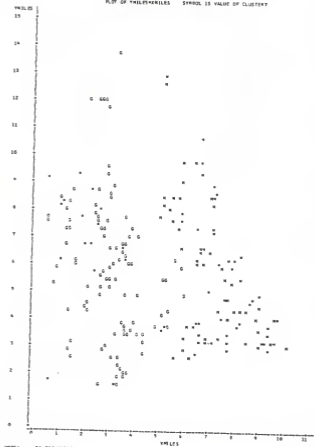
PLOT OF Y-MILES VS X-MILES SYMBOL IS VALUE OF CLUSTERS



LOCATION OF CLUSTERED OBSERVATIONS
 SCATTER PLOT FOR ALL OTHER OBSERVATIONS
 GULFWIND AND BAYLON CONNECTION
 CLUSTER 8 OF 8 CLUSTERS
 PLOT OF KWILDSAMPLES SYMBOL IS VALUE OF CLUSTER 8



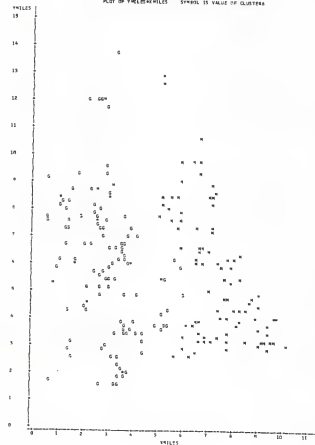
LOCATION OF CLUSTERED OBSERVATIONS
 RELATIVE TO ALL OTHER OBSERVATIONS
 WILSON AND MOULTON, CORRELATION
 CLUSTER 7 OF 6 CLUSTERS
 PLOT OF PHILIPINES SYMBOL IS VALUE OF CLUSTER



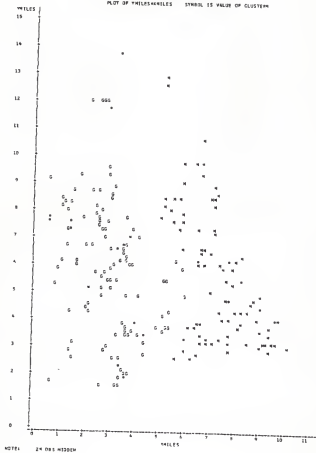
NOTE: 28 OBS. HIDDEN

LOCATION OF CLUSTERED OBSERVATIONS
 RELATIVE TO ALL OTHER OBSERVATIONS
 GOLFORS AND MADISON, CONNECTICUT
 CLUSTER B OF 4 CLUSTERS

PLOT OF Y-MILES/MILES SYMBOL IS VALUE OF CLUSTER



LOCATION OF CLUSTERED OBSERVATIONS
 RESULTS OF CLUSTER ANALYSIS
 OF 24 OBSERVATIONS
 CLUSTER 9 OF 9 CLUSTERS
 PLOT OF *MILES*4*MILES SYMBOL IS VALUE OF CLUSTER



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BIOGRAPHICAL SKETCH

David Scribner, Jr., was born in New York City on August 3, 1936. In 1955, he was graduated from The Taft School in Watertown, Connecticut. At Columbia University Mr. Scribner majored in economics and received his Bachelors of Arts in 1974. He received his Masters in Business Administration from the University of Connecticut with a specialization in finance and real estate in 1978. In February 1979 Mr. Scribner successfully completed his formal doctoral studies at the University of Florida and was admitted to candidacy for the Doctor of Philosophy in business administration. His major field was real estate and urban analysis, and his minor field was urban and regional planning.

In September 1980 Mr. Scribner began a year as Visiting Instructor of Finance and Real Estate at the University of Connecticut. Since then, he has held the position of Instructor of Finance and Real Estate and is a staff member of the Center for Real Estate and Urban Economic Studies at the University of Connecticut. Since 1968 Mr. Scribner has taught for the U.S. Savings and Loan League, the Society of Real Estate Appraisers, Federal City College, and Montgomery Community College. He has lectured throughout the United States and counseled private investors and governments in the United States and Canada with regard to real estate and land use.

Mr. Scribner has been a real estate appraiser and counselor, since 1956. During that period he was also a real estate manager and salesperson. He holds the Senior Residential Appraiser (SRA), Senior Real Property Appraiser (SRPA), and Senior Real Estate Analyst (SREA) designation of the Society of Real Estate Appraisers and the Senior Member (ASA) designation of the American Society of Appraisers.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



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Professor of Real Estate and
Urban Analysis

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



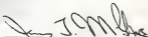
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James T. McClave
Associate Professor of Statistics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


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Professor of Urban and Regional
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This dissertation was submitted to the Graduate Faculty of the Department of Finance, Insurance and Real Estate in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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